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PUBLICATIONS

OF THE

CINCINNATI OBSERVATORY

No. 16

VARIATION OF LATITUDE

1899 to 1906

CINCINNATI

Published by Authority of

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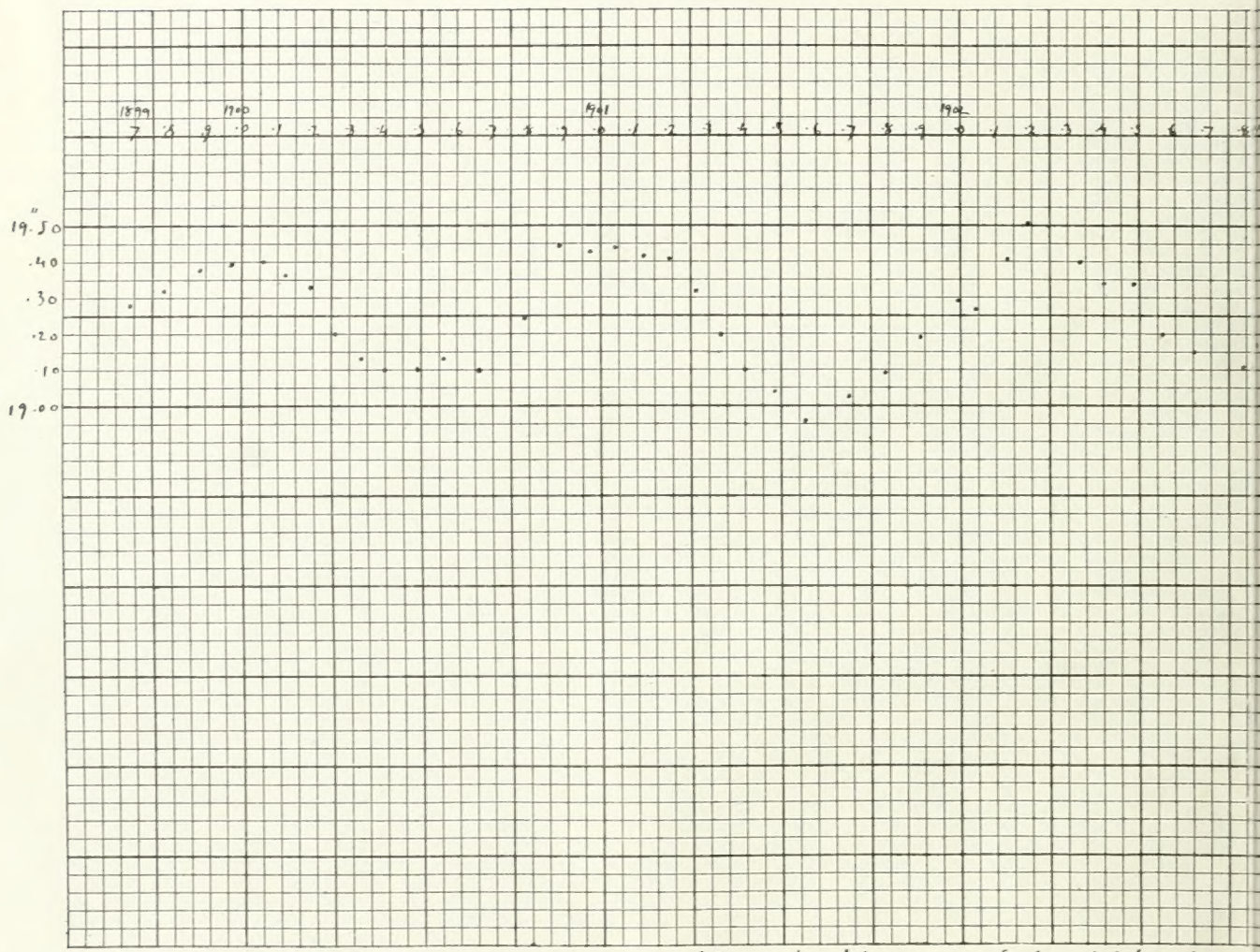
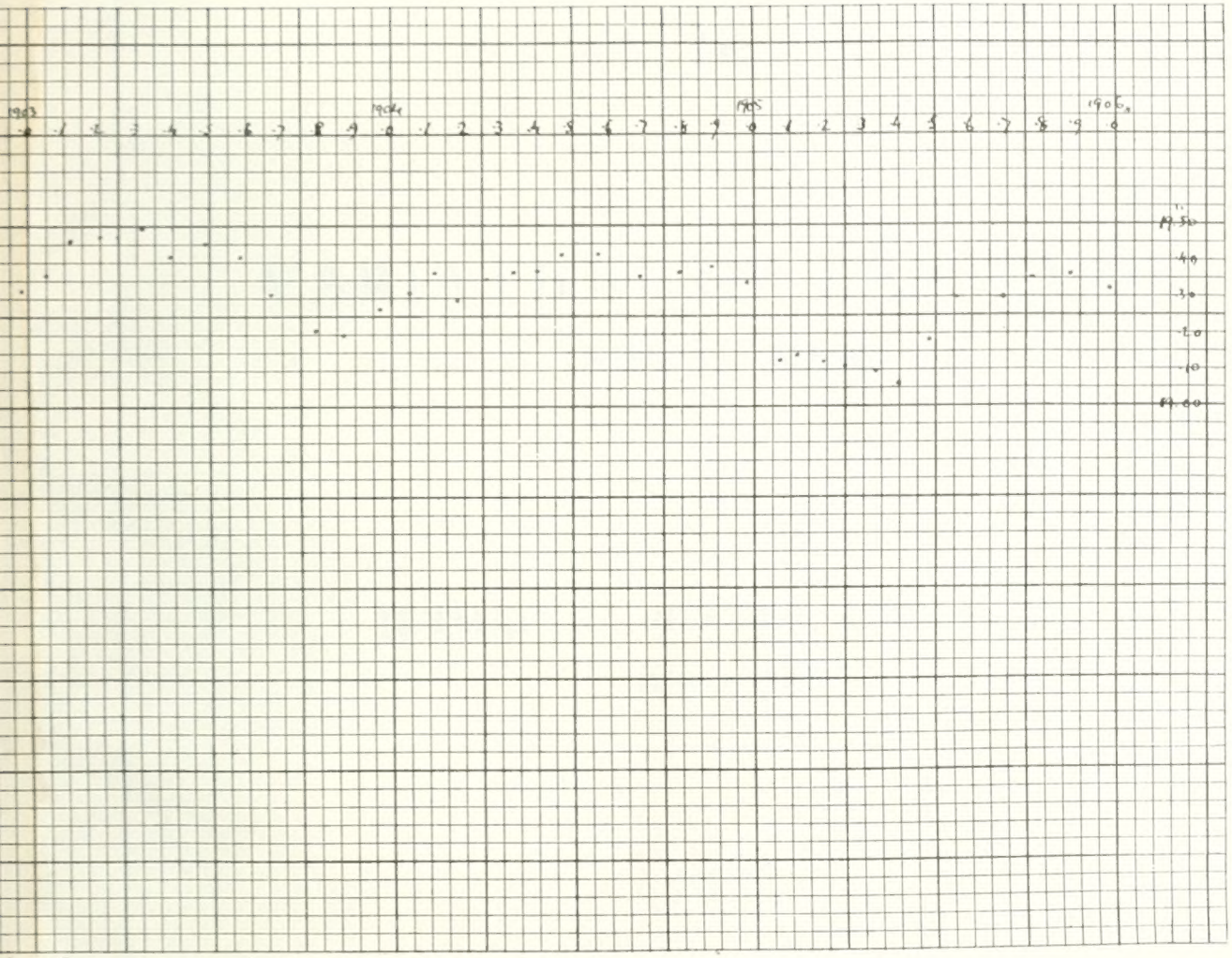
1908



Variation of Latitude



t Cincinnati, 1899 to 1906

Publications of the Cincinnati Observatory

16

VARIATION OF LATITUDE
1899 to 1906

By

JERMAIN G. PORTER, A. M., PH. D.

DIRECTOR

CINCINNATI:
PUBLISHED BY AUTHORITY OF THE BOARD OF DIRECTORS OF THE UNIVERSITY
1908

Historical

The earliest determination of the geographical position of Cincinnati seems to have been made by Colonel Jared Mansfield, Surveyor General of the Public Lands of the United States. At a small observatory erected near his residence in Cumminsville he made numerous observations during the years 1810-1813. The results of these observations appear in our possession, and in any case would be of little value at the present time, owing to the uncertainty of the exact location at which they were executed.

A few years later the French astronomer Ferrers determined the position of Fort Washington, at the summit of the Broadway hill. His results, as published in the Connaissance des Temps, were as follows:

Longitude	5h	22m	28s	West of Washington
Latitude	39°	6′	54″	North

The longitude is, of course, only approximate, since the methods then used were incapable of precision.

In 1848 the longitude of the Cincinnati observatory, then recently founded on Mt. Adams, was telegraphically determined by Professor Mitchel and Sears C. Walker, and in 1870 the latitude was found by Professor Cleveland Abbe. These results are as follows:

Longitude	5h	23m	46s.94	W. from Washington
Latitude	39°	6′	29″.5	North.

The co-ordinates of the new observatory first appear in the American Ephemeris and Nautical Almanac for 1881. The longitude there given is too great by 2″.5, and the latitude by 16″, or very nearly one-third of a mile. I assume that the error originated in measuring the distance between the old and new observatories on a map which was not altogether reliable.

In 1881 the United States Coast and Geodetic Survey established an astronomical station upon the observatory grounds. The latitude was determined in July and the longitude in July, August, September, and October. For the former 105 observations of 21 pairs of stars were made, and gave, after reduction to the center of the dome,

$$39^\circ\ 08'\ 10''.54 \pm 0''.08$$

This result still requires, however, a correction for the variation of the earth's pole, which, computed by Chandler's formula, I find to be +0″.21, making the final value of the latitude

$$39^\circ\ 08'\ 10''.75 \pm 0''.08$$

Longitude signals were exchanged with Washington in July and August, with Nashville, Tenn., in August and September, and with St. Louis, Mo., in September and October. Tabulating the results with the probable errors and the corrections found in the adjustment of the net, we have:

		Obs. Diff.		Cor.
Cincinnati dome and Washington dome	5h 23m	28s.589	± 0s.011	−0s.014
" " Nashville transit	5	28.582	± 0.009	−0.003
" " St. Louis transit	23	28.594	± 0.015	−0.015

Since the longitude of the Washington observatory from the final adjustment of the entire net is

5h 08m 12s.133 ± 0s.042 W. from Greenwich

we have for the definitive longitude of the dome of the Cincinnati observatory referred to the prime meridian of Greenwich:

5h 37m 31s.38 ± 0s.050

It is an interesting fact in this connection that the astronomical and geodetic longitudes and latitudes of the Cincinnati observatory agree very closely, the geodetic longitude being 0″.75 larger and the geodetic latitude 0″.74 smaller than the corresponding astronomical co-ordinates. As the average deviation of the plumb line in the eastern part of the United States is about 2″.5, with some values reaching three times that amount, it is evident that the strata underlying this region are remarkably homogeneous and symmetrical. This may perhaps be the reason for our comparative freedom from earthquake disturbances.

NEW DETERMINATION OF LATITUDE.

The co-ordinates of the observatory as fixed by the operations of the United States Coast and Geodetic Survey were accurate enough for all practical purposes, and no new determination of latitude would have been undertaken with the view merely of bettering these values; but the discovery of a motion of the pole of the earth, with a consequent oscillation of the latitude, introduced a new problem into the science of geodesy, and invested latitude observations with a fresh interest. When, in 1899, the International Geodetic Association took up this problem, the Cincinnati observatory was invited to co-operate. This we have done continuously from September 1, 1899, to the present time.

At the beginning of 1906 a change was made in the star list, and it has therefore seemed a fitting opportunity to publish the results up to that date.

OBSERVATORY AND INSTRUMENT.

There being no suitable location for a zenith telescope in the main observatory, a wooden building three meters square was erected on the grounds. The walls are double, with openings above and below for ventilation, and the roof is constructed in two parts to roll east and west, giving a clear opening of a little over two meters. The pier for the support of the instrument is of brick, $0^{m}.63$ square, capped with sandstone. Its center is $19^{m}.05$ west and $14^{m}.61$ south of the center of the dome.

Through the courtesy of the Superintendent of the United States Coast and Geodetic Survey, Zenith telescope No. 7, by Wanschaff, was loaned for the prosecution of this work. The focal length of the telescope is $1^{m}.00$; aperture, 81^{mm}; magnifying power, 100.

The value of a division of the striding level was determined on the level tryer and found to be 2″.71. This level is used only for keeping the instrument approximately in position, small deviations having no influence whatever on the latitude.

since the pair attached to the telescope when it was received have continued to give satisfaction. The method employed in finding the division values of the levels was to set upon a circumpolar star with the bubble well to one end, then by the slow-motion screw to move the telescope until the bubble was near the other end, and bisect the star again with the micrometer wire, making the bisections at equal distances from the center of the field. In order to eliminate any possible inclination of the wire, as well as to give symmetry in other respects to the determinations, the telescope was moved alternately north and south. The values thus found, converted into arc, are as follows:

			Level B	Temp
				5
Sept., 1907,	2	0 .092		

It would seem that a slight change in the level tubes may have taken place during the first year. The level correction has always been kept small, seldom reaching one-half a division, so that the change, if real, could have no practical effect on the latitude.

For determining the value of a revolution of the micrometer-screw, observations were made on sixteen nights between May 20 and September 29, 1899. These observations were mostly of circumpolar stars at elongation, though a few star pairs were also observed. The resulting value was $51''.508 \pm 0''.007$ at $+23^{\circ}$ C.

Observations of the Pleiades on ten nights in December and January of the following winter gave $51''.509 \pm 0''.005$ at 0° C.

Combining these two determinations we have $1^{t} = 51''.509 - 0''.00135t$.

Observations of the stars in Coma Berenices on twelve nights in April, 1900, gave $51''.597 \pm 0''.004$

After the publication of the definitive declinations by the International Bureau, corrections were obtained from the latitude observations, in the first instance for the period September, 1899, to February, 1902, with the resulting value $51''.622 - 0''.00121t$, and secondly for the period December, 1902, to March, 1904, with the resulting value $51''.640 - 0''.00165t$.

Reducing all these values to 0°, using the mean value of the coefficient of expansion $0''.00138$, we have:

May, 1900,	51 .616.
Dec., 1902, to Mar., 1904,	51 .640.

There is here every appearance of a progressive change in the screw. This change is much more pronounced in the winter than in the summer values, and may well be due to the extremes

of temperature to which the instrument is exposed. Fortunately any slight alteration in the screw can have no perceptible influence on the resulting latitude, since the plus and minus values of the micrometer corrections are so evenly balanced in the several groups.

For the computation I have adopted the value

$$1^{s} = 51''.22 + 0''.00158\,t$$

THE STAR LIST.

The list of stars to be observed was furnished by the Central Bureau, and the most probable declinations were derived by Dr. Fritz Cohn from all the data available at the time. Since his results were published, however, all the stars have been reobserved at Bonn, and quite a number are also contained in the last Cincinnati Catalogue. Using these new determinations, including a few Greenwich observations, and recomputing proper motions when necessary, I have obtained the definitive values for the declinations. The older observations were only used for deriving the proper motions, and in fact I have revised those given by Dr. Cohn only in a few cases. Naturally the greatest weight has been given to the Bonn results, the stars having been observed there on an average eight times apiece. The stars belonging to the refraction pairs have been omitted, as I did not think it worth while to include them in the computation of the latitudes. For ease of comparison, however, the numbers given by Dr. Cohn are retained.

OBSERVED LATITUDES.

In this table are given the resulting seconds of observed latitude as reduced with the instrumental constants and the star declinations indicated above. An S in the last column signifies that the observations were made by Dr. Stewart; all others were made by myself.

Mean Declinations for 1900.0

I	1		+ 18			6.7	
		4		+ 34	26 32.7		
		5		+ 23	27 53.5	0.030	
				+ 54	40 27.0		
	6	7				−0.031	6.7
		8	58	59		0.000	7.0
			1 06	05		0.004	
					+ 57	42 21.2	−0.009	Respighi, Beck., Wash., Green., Cin., Bonn.
	7	10	37	17		0.000	Green., Bonn.
		14	43	50	+ 25	58 31.3	0.000	7.0 Armagh, Camb., Bonn
	8	15	50	16	+ 23	05 13.6	−0.002	6.0 Respighi, Romb., Ber., Cin., Bonn.
								6.5 Hels. G., Harv., Kasan., Bonn.
II	9	17	2 02	27	+ 37	23 05.2	−0.037	Respighi, Lund, Cin., Bonn.
			16	37	+ 40	56 33.3		6.1 Respighi, Green., Cin., Bonn
		21	37	35		−0.007		Fundamental Cat.
		22	47	24		0.025		de Ball, Cin., Bonn.
	12	23	81	32		0.000		Auwers, Lund, Romb., Bonn
		24	58	23		0.000		6.5 Bonn A. G., Lund, Paris, Bonn.
	13	25	3 04	10		−0.025		6.7 Camb., Paris, Bonn.
		26	09	03	+ 50	34 00.4	0.006	Respighi, de Ball, Green, Battermann, Bonn.
	14	27	15	27				Wash., Respighi, Green., Pul., Cin., Bonn.
		28	28	40		0.031		6.9 Bonn.
	15	29	81	34		0.000		6.6 Green., Respighi, Bonn A. G., Bonn.
								Green., Wash., Lund, Bonn.
III	17	33	1 01	37		−0.186		Romb., Green., Lund, Cin., Bonn.
		34	08	05		−0.022		Lund, Green., Strass., Cin., Bonn.
	18	35	13	43		+0.015		Hels. G., Respighi, Green., Bonn.
		36	19	38		−0.053		Green., Ber., Cin., Bonn.
	20	39	45	44				Bonn A. G., Green., Bonn.
		40	30	90	+ 36	00 29.4	−0.009	6.3 Lund, Bonn.
	21	41	5 00	25	+ 62	20 55.9	−0.051	6.9 Hels. G., Cin., Bonn.
		42	05	57			+0.011	Romb., Green., Cin., Bonn.
	22	43	10	55	+ 48	48 54.1	−0.026	Paris, Bonn A. G., Wirtz, Bonn.
		44	14	31	+ 29	28 06.5	+0.012	5.9 Camb., Cin., Bonn.
	23	45	21	38			−0.006	4.8 Respighi, Paris, Green., Ber., Cin., Bonn.
		46	34	33				Respighi, Beck., Cin., Bonn.
IV	25	47	5				+0.027	Respighi, Beck., Romb., Green., Batter., Cin., Bonn
		48	08	58	+ 19	11 25.5	−0.180	Respighi, Rad., Green., Strass., Cin., Bonn.
	26	49	19	43			−0.013	6.8 Ber., Green., Cin., Bonn.
		52	27	36	+ 56	27 53.5	−0.058	6.8 Respighi, Green., Beck., Hels. G., Cin., Bonn.
	27	55					−0.058	6.8 Green., Bonn.
		58	57	21	+ 36	27 34.8	−0.007	6.9 Lund, Bonn.
		60					+0.183	4.8 Fundamental Cat.
		61			+ 46	24 03.0	−0.031	Respighi, Green., Bonn.
		63					0.000	6.9 Bonn
		62	37	26	+ 47	49 26.1	−0.007	6.1 Fundamental Cat.
	32	65	52	53			+0.020	6.3 Romb., Green., Wash., Bonn.
		64			+ 19	07 29.5	−0.017	Green., Battermann, Bonn.

MEAN DECLINATIONS FOR 1900.0

Group and Pair.	No.	Right Asc.	Declination.	P. M.	Mag.	Authorities.
		h m s	° ′ ″	″		
V 33	65	8 03 41	−35 45 16.5	−0.247	6.8	Lund, Cin., Bonn.
	66	17 57	+42 19 36.8	0.000	6.5	Romb., Respighi, Bonn.
35	69	45 24	−45 41 15.3	−0.050	6.4	Bonn.
	70	53 24	+32 48 25.7	0.021	5.5	Respighi, Green., Cin., Bonn.
36	71	58 17	+51 13 20.5	−0.074	7.0	Romb., Wash., Cin., Küstner, Bonn.
	72	9 02 54	+27 02 34.9	−0.371	6.1	Romb., Camb., Cin., Bonn.
37	73	08 38	+25 25 34.6	−0.044	7.0	Paris, Romb., Camb., Cin., Bonn.
	74	13 28	+52 52 21.0	+0.004	7.0	Green., Cin., Bonn.
39	77	35 40	−31 43 56.3	+0.003	6.0	Green., Romb., Cin., Bonn.
	78	42 08	+46 29 12.8	0.091	6.0	Romb., Green., Cin., Bonn.
40	79	57 58	+54 22 31.9	0.000	6.2	Respighi, Green., Cin., Bonn.
	80	10 11 00	−24 00 00.4	+0.037	6.2	Respighi, Green., Ber., Cin., Bonn.
VI 41	81	15 04	+42 21 06.7	0.068	6.8	Respighi, Bonn A. G., Cin., Bonn.
	82	19 59	+35 56 04.7	−0.053	6.7	Respighi, Romb., Lund, Green., Cin., Bonn.
42	83	23 59	−51 30 19.7	−0.038	7.0	Romb., Bonn.
	84	37 32	+26 51 02.8	−0.047	5.7	Romb., Camb., Cin., Bonn.
43	85	41 53	+27 26 16.2	0.000	7.2	Bonn.
	86	46 14	−50 47 51.2	−0.064	6.5	de Ball, Bonn.
44	87	55 14	+39 44 57.0	−0.013	5.3	Bonn A. G., Lund, Cin., Bonn.
	88	58 58	+38 46 48.8	+0.020	6.1	Respighi, Romb., Green., Batter., Cin., Bonn.
46	91	11 21 05	−33 59 59.2	+0.033	6.5	Bonn.
	92	25 06	+44 07 39.9	0.069	6.9	Green., Bonn.
47	93	36 28	−41 47 38.1	−0.036	6.7	Cin., Bonn.
	94	40 21	+36 26 56.0	+0.025	7.1	Bonn.
VII 49	97	12 12 34	+53 44 53.0	−0.032	6.1	Romb., Bonn.
	98	20 13	+24 28 52.8	0.030	6.2	Cin., Bonn.
50	99	29 00	−41 54 03.0	+0.280	4.8	Fundamental Cat.
	100	34 25	+36 30 05.7	0.038	6.5	Battermann, Bonn.,
51	101	38 41	−61 42 09.7	+0.024	6.3	Green., Bonn.
	102	47 29	−16 39 59.6	+0.008	6.5	Ber., Bonn.
53	105	13 09 11	+40 40 56.3	+0.012	5.3	Respighi, Green., Küstner, Cin., Bonn.
	106	19 22	+37 33 21.7	+0.009	6.3	Green., Lund, Bonn.
54	107	23 59	−53 15 50.9	0.004	6.4	Romb., Bonn.
	108	28 04	+24 51 57.9	0.260	6.2	Wash., Ber., Camb., Cin., Bonn.
55	109	33 01	+36 48 12.5	+0.028	5.0	Paris, Green., Romb., Bonn.
	110	41 59	+41 35 24.7	−0.042	5.8	Respighi, Paris, Green., Bonn.
VIII 57	113	14 14 06	+48 27 52.5	−0.050	6.5	Brus., Bonn A. G., Wirtz, Bonn.
	114	17 51	+29 49 36.0	+0.003	6.5	Brus., Leiden, Camb., Bonn.
58	115	23 30	+41 28 25.3	−0.002	6.6	Bonn.
	116	36 33	−37 03 54.7	−0.062	6.1	Respighi, Green., Paris, Cin., Bonn.
61	121	15 21 09	+15 46 46.3	−0.023	5.2	Fundamental Cat.
	122	27 35	+62 26 29.7	−0.004	6.1	Green., Cin., Bonn.
62	123	31 50	−15 25 54.9	+0.016	6.9	Romb., Cin., Bonn.
	124	45 09	+62 54 30.8	0.062	5.8	Fundamental Cat.
63	125	49 59	+46 20 06.9	+0.020	6.9	Bonn A. G., Green., Bonn.
	126	58 46	−31 51 02.7	−0.038	6.8	Bonn.
64	127	16 03 02	+22 05 27.6	−0.040	6.3	Ber., Green., Bonn.
	128	07 14	+56 05 20.0	+0.027	6.4	Romb., Bonn.
IX 66	131	43 24	−59 57 57.7	+0.058	5.0	Fundamental Cat.
	132	50 37	+21 07 09.6	+0.007	5.7	Green., Ber., Wash., Bonn.
67	133	54 41	−12 [illegible] 59.2	−0.047	6.8	Green., Bonn.
	134	59 55	−55 [illegible] 19.1	−0.025	6.4	Beck., Green., Cin., Bonn.

	No						
		09 07	49 51 55.1	0.011	6.6		
		36 59			6.4	Respighi, Green., Ber., Cin., Bonn.	
		41 54		−0.030	5.7		
				0.000	6.4	Romb., Ber., Green., Bonn.	
		53 34			6.2	Bonn.	
					6.4	Bonn.	
			+ 36 26 45.3	0.000		Wash., Lund, Cin., Bonn.	
	145				6.7	Bonn.	
				+ 0.046	5.1	Romb., Respighi, Green., Wirtz, Bonn.	
	147			− 0.079		Green., Cin., Bonn.	
		34 48		0.000	6.2		
	151	19 08 04	+ 40 15 46.7	0.009	6.1	Green., Bonn.	
		12 54			4.6	Fundamental Cat.	
		18 45	+ 26 04 13.5			Green., Cin., Bonn.	
		24 59		− 0.034	6.2	Green., Wash., Romb., Bonn	
	155			+ 0.003	6.8	Green., Bonn.	
					6.4	Bonn A. G., Paris, Lund, Bonn.	
		20 05 43	+ 36 32 42.2			Respighi, Green., Lund, Cin., Bonn.	
	160	10 55				Brus., Romb., Bonn A. G., Bonn.	
		16 04	36 49 02.5	.000		Green., Brus., Yar., Paris, Lund, Bonn.	
		21 56		−0.003		Bonn A. G., Paris, Bonn.	
	82			+ 0.003	6.4	Romb., Respighi, Lund, Cin., Bonn.	
		31 44		0.000	6.7	Respighi, Bonn A. G., Paris, Bonn.	
		43 55		+ 0.021	6.8	Respighi, Bonn A. G., Wash., Bonn.	
		49 51	+ 33 03 26.7	+ 0.052		Green., Wash., Bonn.	
		21 07 02				Lund, Bonn.	
				0.000		Green., Bonn.	
	87					Respighi, Romb., Wash., Green., Cin., Bonn.	
				+ 0.022		Lund, Bonn.	
		46 10	+ 32 11 29.2	−0.008	7.0	Armagh, Paris, Bonn.	
	176	53 10		0.000	7.0	Bonn.	
		58 55				Respighi, Washburn, Wash., Green., Bonn.	
		22 08 22		−0.043		Brus., Paris, Leiden, Green., Cin., Bonn.	
		31 44			6.4	Respighi, Wash., Batter., Wirtz, Green., Bonn.	
		37 04	+ 28 47 07.8	−0.027		Camb., Respighi, Green., Cin., Bonn.	
			+ 55 22 20.3	+ 0.029		Brus , Respighi, Green., Kasan, Bonn.	
	184	57 28		+ 0.010		Wash., Green., Ber., Paris, Bonn.	
	187	23 16 33			7.2	Lund, Bonn.	
			+ 42 21 40.4	+ 0.010	6.0	Beck., Green., Cin., Bonn.	
		27 29		0.022	6.9	Bonn	
		32 39		−0.007	6.4	Romb., Respighi, Bonn.	
		42 35	+ 46 16 37.2		6.7	Romb., Green., Bonn.	
				0.000	6.7	Leiden, Green., Bonn.	

Observed Latitudes

1899		81	82	83	85	87	88	89	91	92	94	95	96
		,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
Sept	1		19.28	19.18	19.30	19.50	19.48	19.20	19.25	19.69			
	2	19.30	19.29	19.45	19.45	19.51	19.33	19.12	19.26	19.50	18.75		
	4	19.41	19.18	19.39	19.43	18.94	19.36	19.32	19.02	18.99	19.17	19.32	19.41
	5		19.56	19.23	19.28	19.04	19.21	19.47	19.07	18.81	19.39	19.02	19.27
	7	19.24	19.23	19.16	18.95	19.42	19.16	19.28	19.47	18.93	18.94	19.16	18.94
	9	19.11	19.14	19.23	19.26			19.34	19.18	18.70	19.40	18.96	19.61
	11	19.57	19.29	19.57	19.47	19.40	19.10	19.49	19.37	19.07	19.23	19.15	19.11
	13	19.05	19.32	19.36	19.58	19.70	19.53	19.22	19.22	18.96	19.06	18.87	19.11
	14	18.97	19.43	19.52	19.12	19.60	19.11	19.48	19.12	18.93	18.82	19.55	19.13
	15	19.17	19.08	19.56	19.04	19.68	19.42	19.25	18.99	19.08	19.46	19.02	19.21
	21	19.59	19.09	19.67	19.59	19.54	19.09	19.31	19.35	19.11	19.32	19.29	19.35

		89	91	92	94	95	96	2	3	4	5	7	8
Sept	26	19.31	18.74	19.03	19.38	18.90	19.23	19.47	19.37	19.22	19.49	19.27	19.16
	27	19.10	19.10	19.03	18.91	19.40	19.53	19.78	19.69	19.28	19.54	19.52	19.25
	30	18.98	19.16	19.12	19.17	19.14	19.34	19.53	19.39	19.69	19.50	18.55	19.27
Oct.	2	19.51	19.35	19.30	19.43	19.20	19.01	19.53	19.55	19.30	19.46	19.30	19.54
	3	19.38	19.15	18.87	19.52	18.72	19.22	19.54	19.47	19.59	19.70	19.27	19.32
	5	19.37	19.04	19.47									
	6	19.38	18.89	18.89	18.90	19.08	19.18	19.51	19.85	19.55	19.63	19.66	19.54
	9	19.31	19.11	19.13	18.96	18.78	19.23	19.53	19.57	19.60	19.61	19.54	19.23
	13	19.22	19.33	19.00	19.09	19.06	19.34	19.81	19.29	19.69	19.37	19.52	19.32
	14	19.21	19.18	19.25	19.34	18.84	19.20	19.64	19.47	19.60	19.49	19.30	19.07
	18	19.11	19.19	19.18	19.33	19.22	19.13	19.44	19.41	19.77	19.50	19.12	19.23
	20	19.43	19.21	19.60	19.45	18.80	19.09	19.55	19.57	19.09	19.68	19.31	19.53
	23	19.07	19.05	19.19	19.38	18.99	19.03	19.29	19.39	19.73	19.41	19.24	19.54
	25	19.51	19.08	18.86	19.11	19.11	18.89	19.21	19.24	19.28	19.57	19.02	19.23
	30	19.14	19.18	19.06	19.21	19.00	19.26		19.36	19.54	19.64	19.35	19.40
Nov.	1	19.43	18.98	19.05	19.02	18.90	18.90	19.23	19.29	19.32	19.27		

		2	3	4	5	7	8	9	11	12	13	14	15
Nov.	4	19.75	19.31	19.51	19.91	19.20	19.48	19.04	19.23	19.59	19.80	19.50	19.31
	6	19.64	19.69	19.36	19.60	19.17	19.02	19.51	19.45	19.57	19.46	19.26	19.84
	8	19.86	18.84	19.20	19.52	18.98	18.97	19.20	19.72	19.55	19.63	19.44	19.27
	9	19.58	19.47	19.23	19.36	19.03	19.30	19.34	19.30	19.62	19.37	19.40	19.71
	19	19.53	19.35	19.33	19.59	19.25	19.15	19.43	19.57	19.67	19.64	19.92	19.28
	20	19.59	19.06	19.52	19.59	19.76	19.17	19.33	19.21	19.35	19.43	19.29	19.35
	24	19.82	19.07	19.14	19.84		19.08	19.66					
	26	19.89	19.46	19.52	19.51	19.32	19.39	19.37	19.56	19.82	19.68	19.63	19.82
	27	19.73	19.09	19.61	19.21	19.07	19.17						
	28	19.32	19.31	19.09	19.11			19.28					
Dec	1		19.20	19.37	19.52	19.14	19.20	19.36	19.37	19.67	19.52	19.43	19.63
	2	19.58	19.23		19.58	19.20	19.28	19.49	19.68	19.21	19.56	19.37	19.29

1899		9	11	12	13	14	15	17	18	20	21	22	23
[illegible]	[illegible]	[illegible]	[illegible]	19.46	[illegible]	[illegible]	[illegible]	[illegible]	19.09	19.26	19.25	[illegible]	19.31
	8	[illegible]	[illegible]	[illegible]	19.61	19.46	[illegible]	18.96	[illegible]	[illegible]	[illegible]	19.76	[illegible]
	16	[illegible]	[illegible]	[illegible]	19.53	19.42	[illegible]	[illegible]	19.50	19.18	[illegible]	[illegible]	19.30
	[illegible]	19.40	[illegible]	19.40	[illegible]	[illegible]	19.28	[illegible]	19.27	19.17	[illegible]	[illegible]	19.44
	[illegible]	[illegible]	[illegible]	19.62	19.16	[illegible]	[illegible]	19.22	19.21	19.26	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19.04	[illegible]	19.24	[illegible]	19.22
	[illegible]	[illegible]	19.43	[illegible]	19.80	[illegible]	19.44	19.46	[illegible]	[illegible]	[illegible]		19.49
	[illegible]	[illegible]	[illegible]	19.42	19.84	[illegible]	[illegible]	[illegible]	19.15	19.04	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	19.53	19.66	[illegible]							
	[illegible]	[illegible]	19.09	[illegible]	[illegible]	[illegible]	[illegible]	19.51	[illegible]	[illegible]	19.15	[illegible]	19.04
	[illegible]	19.16	[illegible]	[illegible]	19.47	19.60	19.24	19.77	19.07	19.12	19.22	19.40	19.40

1900		17	18	20	21	22	23	25	26	28	30	31	32
[illegible]	[illegible]	[illegible]	19.53	[illegible]	19.44	[illegible]							
	21	[illegible]	[illegible]	19.04	[illegible]	[illegible]	19.46	[illegible]	[illegible]	20.03	19.90	[illegible]	18.91
	22	[illegible]	19.22	19.02	19.22	[illegible]	19.45	19.53	[illegible]	19.64	[illegible]	19.24	19.62
	[illegible]	[illegible]	19.07	[illegible]	[illegible]	18.64	19.27	19.42	19.66	[illegible]	19.84	19.22	19.62
	26	[illegible]	[illegible]	[illegible]	19.27	19.29	18.99	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	30	[illegible]	[illegible]	19.41	[illegible]	[illegible]	[illegible]	[illegible]	19.46	[illegible]	[illegible]	19.35	19.11

		25	26	28	30	31	32	33	35	36	37	39	40
[illegible]	[illegible]	19.24	19.34	[illegible]	19.59	19.60	[illegible]	19.51	[illegible]	19.46	19.66	[illegible]	
	[illegible]	19.27	19.64	19.40	19.81	19.19	19.34	19.34	[illegible]	18.99	[illegible]	19.26	[illegible]
	[illegible]	[illegible]	[illegible]	19.52	19.90	19.40	19.16	19.30	[illegible]	19.46	[illegible]	[illegible]	19.16

		33	35	36	37	39	40	41	42	43	44	46	47
[illegible]	25	19.69	[illegible]	[illegible]	[illegible]	19.13	19.06	[illegible]					
	26	19.15	19.00	19.16	19.72	[illegible]	[illegible]	19.59	19.51	19.61	[illegible]	19.31	[illegible]
Mar.	8	19.20	19.39	[illegible]	[illegible]	19.43	19.09	[illegible]	19.00	19.22	[illegible]	[illegible]	[illegible]
	12	19.42	19.26	[illegible]	19.15	19.33	[illegible]	19.14					
	[illegible]	19.26	18.99	[illegible]	[illegible]	19.43	[illegible]	[illegible]	18.95		[illegible]		
	[illegible]	19.29	[illegible]	[illegible]	19.28	19.45	18.75	[illegible]	[illegible]	[illegible]	19.03	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	18.77	[illegible]	19.18	19.00	19.10		18.98	19.44	19.22	19.65
	[illegible]	[illegible]	[illegible]	19.81	[illegible]	19.28	18.94	19.22	19.40	18.86	19.07	[illegible]	19.71

		41	42	43	44	46	47	49	50	51	53	54	55
[illegible]	[illegible]	19.27	[illegible]	[illegible]	19.55	[illegible]	19.49	[illegible]	[illegible]	19.31	[illegible]	[illegible]	[illegible]
	[illegible]	19.55	[illegible]	19.26	19.16	[illegible]	19.39	[illegible]	[illegible]	[illegible]	[illegible]	19.20	[illegible]
Apr.	[illegible]	[illegible]	[illegible]	18.79	[illegible]	[illegible]	[illegible]	[illegible]	18.87	[illegible]	[illegible]	18.96	18.94
	[illegible]	[illegible]	[illegible]	19.34	[illegible]	18.95	[illegible]	19.08	19.09	19.35	19.28	19.12	19.28
	[illegible]	[illegible]	18.98	[illegible]	[illegible]	19.08	[illegible]	19.21	[illegible]	19.42	19.14	19.27	19.25
	[illegible]	19.48		19.13	19.39	19.06							
	[illegible]	[illegible]	18.94	[illegible]	[illegible]	19.22	19.20	[illegible]	19.15		19.14	[illegible]	[illegible]

		49	50	51	53	54	55	57	58	61	62	63	64
		"	"	"	"	"	"	"	"	"	"	"	"
Apr.		[illegible]35	19.04	19.07	[illegible]23	19.29	19.22	18.92	19.56	19.43	18.93	19.13	18.87
	22	[illegible]	19.00	19.08		18.95	18.80	18.77	19.33	19.08	19.34	19.12	19.09
	23	[illegible]25	19.33	19.33	19.46	[illegible]50	19.15	19.17	19.51	19.09	19.27	19.10	18.81
	25	18.81	[illegible]13	[illegible]37	[illegible]38	19.33	19.17	18.90	19.06	18.86	18.84	19.21	19.06
	26	[illegible]28	[illegible]48	19.51	19.27	19.40	19.14	19.15	19.23	19.26	19.18	18.81	19.00
	28	19.22	19.32	[illegible]5	18.89	18.99	19.27	19.01	18.70	18.60	18.86	18.89	18.90
May	3	[illegible]31	19.08	19.22	[illegible]87	[illegible]48	19.32	19.35	19.07	18.71	19.18	19.28	19.08
	4	[illegible]34	[illegible]75	18.98	19.24	19.17	19.16	19.20	19.04	[illegible]88	18.86	19.07	19.11
	20	19.06	19.06	19.22	19.04	[illegible]41	19.26	18.99	19.27	[illegible]03	19.28	18.96	[illegible]93
	21	19.00	[illegible]01	[illegible]25	[illegible]37	[illegible]07	19.00	[illegible]37	[illegible]34	18.79	18.84	18.95	18.94

		57	58	61	62	63	64	66	67	68	70	71	72
May	13	[illegible]23	19.29	18.96	[illegible]09	18.79	19.24	19.27	[illegible]28	19.20	[illegible]35		[illegible]06
	15	[illegible]25	[illegible]36	18.93	18.96	[illegible]15	19.22	18.82	[illegible]48	[illegible]37	19.07	19.10	[illegible]13
	20	[illegible]39	[illegible]38	19.00	19.01	19.06	18.80	19.12	19.11	19.19	19.25	19.24	19.12
	21	18.54	[illegible]55	19.21	18.52	18.89	18.91	[illegible]10	19.15	18.88	19.16	19.01	[illegible]37
	25	18.95	19.09	19.20	[illegible]88	19.02	18.54	[illegible]03	[illegible]49	19.26	18.94	19.04	19.13
	26	18.93	[illegible]29	[illegible]13									
June	3	18.73	[illegible]56	18.87	18.85	19.00	19.27	18.94	[illegible]30	19.22	[illegible]03	[illegible]10	18.72
	4	19.27	19.49	[illegible]33	19.09	[illegible]80	18.91	[illegible]14	19.28	19.11	19.27	19.15	18.94
	5	[illegible]86	19.18	18.82	[illegible]83	19.24							
	8	19.60	19.08	19.28	[illegible]03	[illegible]15	[illegible]88	18.66	19.07	19.02	18.85	18.90	[illegible]82

		66	67	68	70	71	72	73	74	76	77	78	80
June	9	18.69	[illegible]3	19.24	18.94	18.86	[illegible]98	18.74	18.68	[illegible]13	[illegible]05	19.29	19.17
	10	[illegible]78	19.40	19.03	19.27	[illegible]11	19.04	[illegible]05	18.98	[illegible]34	19.04	[illegible]51	19.29
	25				[illegible]33	18.93	19.06	19.07	19.00	[illegible]28	18.93	[illegible]38	[illegible]36
	27	[illegible]93	[illegible]54	[illegible]01	[illegible]12	18.70	[illegible]31						
	28	18.76	[illegible]43		19.01	[illegible]78	19.03	19.09	19.23	[illegible]87	18.96	19.16	
	30	[illegible]65	19.16	[illegible]80	19.40	19.49	18.90	19.05	[illegible]10	[illegible]44	19.10	19.29	19.07
July	1	[illegible]82	[illegible]04	[illegible]37	[illegible]30	18.91	19.04	19.05	19.08	19.05	[illegible]87	[illegible]29	[illegible]21
	2	[illegible]88	[illegible]96	[illegible]15	19.12	19.09	[illegible]31	18.92	19.37	[illegible]53	19.04	19.08	19.13
	3	[illegible]81	19.26	[illegible]01	19.29	18.94	19.23	19.42	18.96	[illegible]30	19.24	19.23	19.54
	5	18.87	19.28	19.18	19.02	[illegible]10	19.19	18.91	[illegible]27	[illegible]10	18.97	[illegible]31	[illegible]44
	6	[illegible]94	[illegible]56	18.60									

		73	74	76	77	78	80	81	82	83	85	87	88
July	11	19.18	[illegible]00	19.45	18.93	19.16	[illegible]33	19.22	[illegible]13	[illegible]23	[illegible]42	19.08	19.09
	12	19.23	19.00	[illegible]30	19.17	19.11	19.42	19.22	19.20	19.32	19.25	[illegible]19	[illegible]30
	13	[illegible]08	19.18	[illegible]33	18.90	[illegible]37	[illegible]47	19.22	[illegible]05	[illegible]30	18.95	19.20	[illegible]11
	14	[illegible]25	18.82										
	15	[illegible]82	[illegible]10	[illegible]15	19.09	18.78	19.46	[illegible]83	19.05	19.02	19.16	19.39	19.22
	26	[illegible]	19.17	18.95	18.90	[illegible]13	19.17	[illegible]03	[illegible]03	19.52	[illegible]11	19.22	19.21
	27	18.80	19.04	[illegible]13	18.97	[illegible]30	19.12	19.44	19.26	[illegible]34	18.93	19.46	[illegible]58
	28	19.07	19.06										
		[illegible]01	18.95	19.12	19.13	[illegible]57	19.02	[illegible]13	18.90	19.29	[illegible]20	[illegible]47	19.06
Aug.	1	[illegible]	[illegible]	19.03	[illegible]	19.22	[illegible]13	[illegible]21	18.92	[illegible]15	18.81	[illegible]47	19.00
	1	[illegible]	[illegible]										

1900		81	82	83	88	87	88	89	91	92	94	95	96
Aug.	17	[illegible]	[illegible]	[illegible]									
	18	18.53	[illegible]	[illegible]									
	19	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	18.67					
	20	[illegible]	[illegible]	19.25		[illegible]	18.91	19.14	18.84	[illegible]	18.87	[illegible]	[illegible]
	21	[illegible]	[illegible]	[illegible]	19.41	19.13	19.23	19.41	18.86	[illegible]	18.93	18.78	[illegible]
	22								19.01	19.14	19.08	18.96	18.94
	23	19.37		19.31	[illegible]								
	25					18.99	19.28	18.81	18.66		18.82	18.92	19.11
	26	18.98	[illegible]	[illegible]	18.91	19.19	18.91	[illegible]	19.34	19.23	19.09	19.13	[illegible]
Sept.	30	19.11	[illegible]	[illegible]	[illegible]	19.31	18.91	19.22					

		80	91	92	94	95	96	2	3	4	5	7	8
Sept.	27	[illegible]	[illegible]	[illegible]	[illegible]	19.20	19.06	[illegible]	[illegible]		19.28	[illegible]	[illegible]
	29	[illegible]	[illegible]	18.73	18.94	18.79	18.99	[illegible]	19.21	19.64	[illegible]	19.56	[illegible]
	30	[illegible]	[illegible]	[illegible]	[illegible]	19.27	[illegible]	[illegible]	[illegible]	19.65	19.39	19.17	19.17
Oct.	1	[illegible]	[illegible]	18.92	19.18	18.85	19.18	19.17	[illegible]	19.39	19.44	19.14	[illegible]
		[illegible]	[illegible]	19.09	19.12	18.87	18.97	19.55	19.22	[illegible]	19.50	[illegible]	[illegible]
	5	[illegible]	19.09	19.07	18.99	[illegible]	19.06	19.46	19.20	19.85	[illegible]	19.65	[illegible]
	7	[illegible]	18.69	19.00	[illegible]	19.30	[illegible]	[illegible]	19.16	[illegible]	19.45	[illegible]	[illegible]
	13	[illegible]	[illegible]	19.07	19.19	19.26	18.75	19.06	19.18	[illegible]	19.31	19.22	[illegible]
	14	19.22	19.16	18.84	[illegible]	18.73	19.01	19.46	[illegible]	19.22	[illegible]	19.14	[illegible]
	15	[illegible]	19.08	[illegible]	18.76	18.77	19.26	19.33	18.97	19.63	[illegible]	18.98	18.99
	17	19.44	[illegible]	19.23	[illegible]	18.70	18.88	[illegible]	19.45	19.46	19.47	19.56	[illegible]
	19	19.33	19.00	19.22	19.23	[illegible]	19.07	19.48	19.21	[illegible]	[illegible]	19.47	[illegible]
	23	[illegible]	[illegible]	[illegible]	18.70	18.88	[illegible]	19.62	19.21	19.27	[illegible]	19.14	[illegible]
	27	18.77	[illegible]	19.12	[illegible]	[illegible]	[illegible]	19.51	19.37	[illegible]	[illegible]	[illegible]	19.53
Nov.	1	[illegible]	[illegible]	19.32	19.13	19.08	[illegible]	19.50	[illegible]	[illegible]	[illegible]	[illegible]	19.47

		2	3	4	5	7	8	9	11	12	13	14	15
Nov.	3	[illegible]	[illegible]	19.64	19.33	[illegible]	[illegible]	19.44	[illegible]	[illegible]	19.67	19.61	[illegible]
	4	[illegible]	19.55	19.59	19.75	[illegible]	[illegible]	19.59	[illegible]	19.52	19.51	[illegible]	19.09
	10	[illegible]	[illegible]	19.01	[illegible]								
	12	[illegible]	19.59	19.60	19.60	[illegible]			[illegible]	19.57	[illegible]		
	15	[illegible]	20.28	19.57	20.15	[illegible]	19.29	19.74	19.74	19.70	19.67	19.56	19.77
	18	[illegible]	19.62	19.28	19.22	19.40	18.89						
	22			[illegible]	19.48								
	26	[illegible]	19.37	[illegible]	[illegible]	[illegible]	19.10	[illegible]	19.54	19.64	[illegible]	19.27	19.18
Dec.	1	[illegible]	[illegible]	19.51	19.60	[illegible]		19.23	19.17				
	3	[illegible]	19.25	19.17	19.75	[illegible]	19.09	19.77	[illegible]	19.76	19.64	19.70	19.64

		9	11	12	13	14	15	17	18	20	21	22	23
Dec.	4	[illegible]	[illegible]	19.41	[illegible]	19.24	19.09	[illegible]	19.28	19.22	19.27	19.24	19.31
	11	[illegible]	19.65	19.55	19.99	19.52	[illegible]	19.37	19.37	18.92	19.27	19.46	19.37
	13	[illegible]	[illegible]	19.68	19.95	19.57	19.34	19.48	19.04	19.34	[illegible]	19.27	19.61
	17	[illegible]	19.25	19.66	19.25	19.64	[illegible]	19.46	[illegible]	19.13	19.47	[illegible]	[illegible]
	20	19.44	19.47	19.74	[illegible]	[illegible]	[illegible]	19.54	19.09	19.19	19.61	[illegible]	19.18
	21	[illegible]	[illegible]	19.44	[illegible]	19.40	19.40	[illegible]	19.10	19.13	19.39	19.44	19.33
	26	19.49	19.17	19.68	19.67	19.48	19.41	19.96	[illegible]	19.09	[illegible]	[illegible]	[illegible]
Jan.	1	19.64	19.87	19.71	19.60	19.07	19.47	19.17	[illegible]	19.00	19.27	[illegible]	[illegible]
	3	[illegible]	19.57	19.40	19.86	[illegible]	19.47	[illegible]	19.27	19.19	19.39	19.46	19.27

	17	18	20	21	22	23	25	26	28	30	31	32
	"	"	"	"	"	"	"	"	"	"	"	"
Jan. 5	19.20	[illegible]	19.06	19.30		19.67	19.16	19.36	[illegible]	20.13	[illegible]	[illegible]
7	[illegible]	19.04	[illegible]	19.23	19.56	[illegible]	19.66	19.69	[illegible]	19.64	19.46	[illegible]
[illegible]	[illegible]	19.64	19.42	19.23	19.73	19.47	[illegible]	20.11	19.69	19.72	[illegible]	
9	[illegible]	[illegible]	[illegible]	19.13	[illegible]	19.40	[illegible]	[illegible]	[illegible]	19.72	[illegible]	19.27
13	[illegible]	[illegible]	[illegible]	19.02	[illegible]	[illegible]	19.39	19.61	19.50	[illegible]	[illegible]	19.43
15	19.65	[illegible]	19.09	[illegible]	19.43	19.42	19.35	19.24	19.40	19.66	19.69	19.55
16	[illegible]	[illegible]	[illegible]	19.46	19.23	19.36	19.02	[illegible]	19.66	[illegible]	[illegible]	19.64

	25	26	28	30	31	32	33	35	36	37	39	40
Feb. 6	[illegible]	[illegible]	19.21	19.82	[illegible]	18.90	19.60	19.16	[illegible]	19.79	19.67	18.92
[illegible]	[illegible]	[illegible]		[illegible]								
12	[illegible]	[illegible]	[illegible]	19.60	19.27	[illegible]	19.22	19.00	19.22	19.53	[illegible]	[illegible]
14	[illegible]	19.62	[illegible]	19.74	19.55	[illegible]	[illegible]	[illegible]	[illegible]	19.72	19.45	19.40
15	[illegible]	19.65	[illegible]	[illegible]	19.78	19.31	19.17	19.26	19.34	[illegible]	19.27	
17	[illegible]	[illegible]	[illegible]	19.96	19.62	[illegible]	[illegible]					
23									[illegible]	[illegible]	[illegible]	18.91

	33	35	36	37	39	40	41	42	43	44	46	47
Feb. 25	[illegible]	19.59	[illegible]									
26	[illegible]	[illegible]	18.84	19.69	19.20	19.10	[illegible]	[illegible]	[illegible]	[illegible]	19.41	[illegible]
27	19.75	[illegible]	[illegible]	19.58	19.42	[illegible]	[illegible]	[illegible]	19.59	[illegible]	19.21	[illegible]
Mar. 6	[illegible]	19.41	[illegible]	19.42	19.27	[illegible]	[illegible]	19.26	[illegible]	19.17	[illegible]	[illegible]
11	[illegible]	18.89	[illegible]	[illegible]	19.61	19.29	19.81	[illegible]	19.12	19.42	[illegible]	19.56
12	[illegible]	[illegible]	19.21	19.67	[illegible]	[illegible]	[illegible]	19.30	18.98	[illegible]	19.62	19.48
18	[illegible]	[illegible]	19.29	[illegible]	19.49	[illegible]	[illegible]		19.07	[illegible]	19.49	[illegible]
21				19.54	[illegible]	[illegible]	[illegible]	[illegible]	18.86	19.14	19.42	19.48

	41	42	43	44	46	47	49	50	51	53	54	55
Mar. 24	[illegible]	19.29	19.40	19.24	[illegible]	[illegible]	19.35	[illegible]	[illegible]	[illegible]	[illegible]	19.27
[illegible]	[illegible]	19.68	[illegible]	19.43	[illegible]	19.45	19.16	19.46	19.29	19.05	19.39	19.16
Apr. 2	[illegible]	[illegible]	19.29	19.06	[illegible]	19.29	19.23	19.24	[illegible]			
3	[illegible]	[illegible]	18.91	19.44	19.29	[illegible]	19.23	[illegible]	19.29	18.95	[illegible]	[illegible]
[illegible]	[illegible]	19.09	18.92	19.28	19.61	19.69	19.30	19.08	[illegible]	19.45	19.62	19.35
11	[illegible]	[illegible]	[illegible]	[illegible]								
12					[illegible]	19.66						
15	19.62	19.10	19.10	[illegible]	[illegible]	[illegible]	19.17	19.26	19.42	19.25	19.39	[illegible]

	49	50	51	53	54	55	57	58	61	62	63	64
Apr. [illegible]	[illegible]	19.27										
24					[illegible]	19.36						
25	[illegible]	[illegible]	19.36	19.29	19.29	19.34	[illegible]	18.92	19.19	19.04	19.60	[illegible]
[illegible]	19.24	[illegible]	[illegible]	[illegible]	[illegible]	19.22	[illegible]	[illegible]	19.01	19.46	[illegible]	[illegible]
27	[illegible]	19.16	19.60	[illegible]	19.06	[illegible]	19.40	[illegible]	18.73	[illegible]	19.12	19.67
28	[illegible]	19.18	[illegible]	[illegible]	[illegible]	[illegible]	19.16	[illegible]	[illegible]	19.55	19.08	[illegible]
May 1	[illegible]	[illegible]	19.13	19.01	19.00	[illegible]	19.31	19.06	19.00	[illegible]	[illegible]	19.16
2	19.19	[illegible]	19.27	19.20	19.09	18.85						
[illegible]	[illegible]	19.24	19.45	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19.48	[illegible]	19.24	[illegible]	[illegible]	19.27	[illegible]	18.84
[illegible]	[illegible]	19.27	[illegible]	19.14	19.06	[illegible]	19.17	19.09	18.91	19.18	18.70	19.39

		57	58	60	62	63	64	66	68	69	70	71	72
	13						18.98	18.76				18.90	
	14				18.92	19.17	19.10	18.69					19.17
	17		18.97	19.27									
	22	19.26		19.04	18.77	19.11	18.77	18.96	19.00	19.09		18.98	19.11
			19.27										
					18.77		18.94	19.25					
	1					19.08		18.87				19.01	
		19.22			19.10	18.80	19.02	19.22	19.12	19.35	18.96	19.44	19.22
				19.18	19.21	19.07	18.89	19.13		18.97	19.40		
				18.92	18.60	18.72	19.07	18.76	19.34				

		56	57	58	60	71	72	73	74	76	77	78	80
			19.22		19.26	18.96	19.28	18.70	19.00	19.10		19.21	
	10	18.80	19.25	18.83	19.21	19.09	19.07	19.10			19.29	19.19	19.23
	16		18.87		19.01		19.20	19.00	18.92	19.35	18.80		19.17
		18.75	19.01		19.23	19.33	18.82	19.28		19.25	18.87	18.94	19.12
				18.99	19.07			19.24	18.83	19.06		18.97	19.21
	5	19.09	19.16	18.95	19.16	19.07	18.97	19.05	18.96	19.02	18.90	19.19	
		18.52	19.24	19.22	19.40		19.28	18.96		19.15	19.16	19.11	
				19.07	18.97				18.84	18.97			

		73	74	76	77	78	80	81	82	83	85	87	88
July	11		19.02	19.27	18.64	19.02	19.03				18.58		18.94
	13	19.05	18.86	19.27	19.18		18.82	19.09	18.86		18.85		19.11
	14												
					18.99	19.07	19.11	19.10	18.93				19.06
					18.87	18.98		18.99				19.10	19.42
		18.92	19.00		18.57	18.79		19.24		19.14	18.69	19.02	19.29
		18.92	18.64	18.62			19.02	19.08	18.84		18.77		19.08
	29	18.90			18.95	19.07	18.92	19.02			18.90	18.96	19.01
	31	19.29	18.97	18.94		19.11	19.04	19.00	18.75	18.94	18.77		18.91
Aug.	1	19.02			18.82	18.98	19.21	18.87	18.61	19.04		18.97	19.29
	8	18.92		18.93	18.67		19.05				18.68	19.04	19.27
					18.70	19.24	19.29	18.80		19.01		19.18	19.05
						19.03	18.95	18.94	18.83	18.98	18.82	18.88	
		18.83	18.56		18.79		18.97	19.06		19.29	18.97	18.85	
			18.84	19.04			18.93	18.90	18.64	19.16	18.98	19.00	

		81	82	83	85	87	88	89	91	92	94	95	96
		18.81	18.73			19.17			19.10	19.09	18.94	19.07	18.90
			18.86	19.13			19.16	19.03	18.98	18.87	19.01	18.52	19.18
			18.97	18.97		18.85	18.78	18.94	18.98	18.73		18.94	18.90
		18.92					18.97	19.02	18.93			18.85	
Sept.	1	19.22	19.04	19.16									
			18.91	19.42	18.76		19.02				19.18		
					18.90	19.29	18.58	19.18	18.91	18.79	19.10	18.66	
						19.19	19.06	18.70	18.98	19.04			
		19.03	19.15	19.18	18.82		19.01	18.85	18.78	18.87	18.99	19.11	
	21		19.06	19.08	18.90	19.31	18.89		19.08	18.67	18.87	18.96	19.04

1901		89	91	92	94	95	96	2	3	4	5	7	8
				″	″	″	″	″	″	″	″	″	″
Sept.	20	[illegible]	19.09	18.80	18.86	18.90	19.02	19.16	19.32	19.41	19.20	19.07	19.07
	23	[illegible]	19.14	18.82	18.81	19.05	18.84	19.27	19.00	19.55	19.42	19.18	19.02
	26	18.98	18.81	18.56	18.98	18.96	19.17	19.40	19.40	19.32	19.11	19.12	19.18
	29	19.24	18.72										
Oct.	2	19.09	18.83	18.82	18.80	18.78	18.69	19.03	19.07	19.17	19.30	19.05	19.18
	3	19.13	19.04	19.04	18.90	19.26	19.44	18.99	18.98	19.64	19.05	19.02	19.07
	5	[illegible]	18.72	18.83	18.95	18.94	18.89	19.34	19.43	18.96	19.20	19.32	18.85
	6	19.16	18.76	18.90	18.91	19.05	19.25	18.96	19.32	19.31	19.27	19.52	19.07
	14	18.97	18.89	18.68	19.19	19.05	19.31	19.27	19.26	19.06	19.35	18.78	19.16
	15	18.97	18.87	18.79	18.97	18.87	19.10	19.26	19.10	19.20	18.98	18.78	19.22
	17	18.94	18.68	18.88	18.33	19.08	18.68	19.23	19.24	19.02	19.16	18.87	19.18
	21	19.23	18.91	18.68	19.06	18.91	19.04	19.24	18.90	19.74	19.10	19.17	19.07
	23	19.00	18.80	18.61	19.05	19.02	18.94	18.87	18.89	19.42	19.17	19.28	18.92
	25	19.22	18.82	18.96	19.08	18.93	19.16	19.17	19.12	19.49	19.31	18.76	18.86
Nov.	1	19.72	18.85	18.74	18.62	18.90	19.06	19.13	19.07	19.14	19.39	18.91	19.00

		2	3	4	5	7	8	9	11	12	13	14	15
Nov.	2	19.21	19.02	19.28	19.16	18.91	18.91	18.93	18.96	19.52	19.06	18.88	19.42
	4	19.09	19.36	19.11	19.29	19.16	18.78	19.57	19.14	19.26	19.50	18.94	19.28
	8	19.33	19.10	19.07	19.38	19.06	19.00	18.88	18.84	19.47	1 .65		
	9	19.25	19.34	18.92	19.26	18.87	18.78	19.05	19.06	19.34	19.40	19.31	19.24
	10	19.21	19.16	19.50	19.14	18.92	19.25	19.28	19.47				
	13	19.16	19.06	19.09	19.10	19.05	19.07	19.25	19.07	19.23	19.33	19.41	19.36
	18	19.47	19.33	19.13	19.65	18.92	18.95	18.86	18.94	19.36	19.35	19.17	19.34
	21	19.40	19.25	19.39	19.14	19.20	19.00	19.50	19.07	19.31	19.37	19.45	19.37
	27							19.21	19.06	19.27	19.19	19.14	19.21
	30	19.48	19.29	19.42	19.27	19.16	19.23	19.18	19.30	19.28	19.25	19.32	19.30
Dec.	1	19.45	18.90	19.70	19.34								
	4	19.20	19.30	19.23	19.33	19.10	19.17	19.31	19.58	19.65	19.53	19.55	19.43
	6	19.27	19.28	19.40	19.35	19.02	18.97	19.51					

		9	11	12	13	14	15	17	18	20	21	22	23
Dec.	12	19.39	18.99	19.44		19.61	19.33						
	15		19.03	19.20	19.46	19.10	19.31	19.54	19.24	19.32	19.62	19.21	19.24
	21	19.36	19.01	19.65	19.34	19.34	19.59	19.12	19.46	19.38	19.44	19.44	19.24
	27						19.03	19.20	18.91	18.81	19.44	19.04	19.33
	30	19.60	19.00	19.46	19.34	19.50	19.38	19.26	19.16	19.19	19.10	19.22	19.43
	1	19.07	18.86	19.16	19.30	19.35	19.47	18.95	19.06	19.00	19.26	18.71	19.24
Jan.	1	[illegible]	19.11	19.81	19.17	19.37	19.40	19.19	19.01	19.12	19.18	19.35	19.39
	4	19.55	19.47	19.45	18.90	19.45	19.33	19.08	19.13	19.24	19.34	19.44	19.63

1902		17	18	20	21	22	23	25	26	28	30	31	32
Jan.	6	[illegible]	19.06	19.38	19.06	19.37	19.43	19.30	19.27	19.39	19.83	19.32	19.23
	7	19.39	19.09	19.24	19.36	19.41	19.26	19.16	19.53	19.31	19.59	19.23	19.20
	9	19.08	19.28	19.30	19.35	19.33	18.93						
	10	[illegible]	[illegible]	18.93									
	13	[illegible]	[illegible]	18.71	19.36	19.14	19.23	19.27	19.48	19.67	19.72	19.28	19.44
	16					19.14	19.26	19.06	19.52	19.05	19.60	19.58	19.08
	27	[illegible]	18.72	18.74	18.96	18.81	19.04	19.39	19.06	19.25	19.55	19.55	19.13

1902		28	30	28	30	31	32	33	35	36	37	39	40
[illegible]													
			19.66				19.34						
					19.90		19.37	19.89					
			19.35	19.48	19.75		19.14	19.35			19.59		
			19.57	19.82	19.96	19.46	19.46	19.42	19.32				
			19.70		19.78				19.20				
				19.66	19.90	19.42	19.71	19.55	19.17	19.57		19.26	19.33

		33	35	36	37	39	40	41	42	43	44	46	47
[illegible]			19.47			19.52		19.68	19.70		19.83	19.45	19.72
				19.33	19.70	19.53	19.48	19.44	19.42	19.40		19.31	
			19.59	19.50	19.86	19.64	19.26		19.54		19.75	19.13	19.75
			19.23	19.20		19.46	19.22				19.75	19.49	19.60
		19.37	19.49	19.73	19.62	19.32	19.34	19.81	19.31	19.08		19.32	19.69
			19.43	19.46		19.46	19.57	19.69	19.64	19.06	19.78	19.67	19.37
				19.40		19.57	19.60		19.89		19.70		19.35

		41	42	43	44	46	47	49	50	51	53	54	55
Mar			19.40	19.04		19.47	19.61						
	25	19.64	20.09			19.27		19.53		19.91	19.41	19.92	19.52
			19.63	19.27	19.40								
Apr	1		19.48	19.16			19.59	19.34		19.69			
	6		19.69	19.35	19.48	19.35	19.57	19.42	19.43	19.72	19.35	19.39	19.74
	10	19.53		19.32	19.46	19.45	19.42	19.14		19.59	19.18	19.53	
		19.74	19.26	18.89	19.25		19.41	19.24	19.34	19.67		19.65	19.40

		49	50	51	53	54	55	57	58	61	62	63	64
Apr		19.28	19.02	19.87	19.34		19.39	19.22		18.95		19.60	
			19.27	19.57									
			19.40	19.49		19.12		19.44		19.53	19.49	19.25	
			19.48	19.53	19.33	19.25	19.24	19.49					
		19.35	19.61	20.01	19.53	19.35	19.43	19.52	19.87				
May	1		19.29	19.34			19.29		19.53	19.34			
	2	19.34	19.35	19.78	19.47	19.37	19.52	19.35		19.14	19.37	19.11	
		19.27	19.50	19.60	19.23	19.33	19.46	19.55					
	5	19.72	19.35	19.80	19.45		19.51	19.41	19.46	19.37		19.49	19.15
	7	19.10	19.40	19.78	19.29	19.07	19.29	19.20	19.46		19.27	19.20	
	8	19.42		19.29	19.49		19.35	19.69	19.60	18.99			

		57	58	61	62	63	64	66	67	68	70	71	72
May					19.20								
			19.71	19.26		19.53	18.91	18.75	19.39				19.40
	19	19.22	19.48	19.43		19.31	18.92	18.92	19.55	19.30	19.54	19.37	19.38
		19.46	19.59	18.92				19.28	19.54	19.27		18.97	
		19.41	19.22	19.33	19.02		19.34	19.34	19.57	19.22	19.49		19.69
June	1		19.42										
	2		19.31	19.07	19.37		19.22	19.26	19.41	19.30	19.47	19.22	19.35
		19.42		19.46	19.45	19.51	19.00	19.23		19.27		19.19	19.24
	5			19.09	19.30	19.28			19.33	19.23	19.39	19.22	19.48

1902		66	67	68	70	71	72	73	74	76	77	78	80
		"	"	"	"	"	"	"	"	"	"	"	"
June	[illegible]	[illegible]	19.32	19.38	19.42	19.35	19.42	19.33	19.46	19.63	19.23	19.50	
	12	[illegible]	[illegible]	19.22	19.48	[illegible]	[illegible]	19.50	19.05	19.63	19.19	19.18	19.45
	17	19.22	[illegible]	19.39	19.48	19.29	19.30	19.16	19.22	19.51	19.25	19.41	19.52
	20	[illegible]	19.31	19.44	[illegible]	19.31	19.11	19.46	19.22	19.37	19.36	19.42	19.91
	22	19.10	19.34	19.38	19.64	19.21	19.61	19.27	19.36	19.63	19.50	19.57	19.45
July	1	[illegible]	19.49	19.16	19.74	19.20	19.60	19.39	18.93	19.60	19.16	19.31	19.60
	2	[illegible]	19.53	19.45	19.82	19.15	19.19	19.23	19.56	19.35	19.09	19.35	19.39
	3	19.21	19.18	19.18	19.61	19.14	19.29	19.19	18.99	19.19	19.21	19.25	19.48
	6	19.04	19.32	18.99	19.51	19.27	19.52	19.21	19.22	19.64	19.34	19.39	19.42
	8	19.03	19.30	19.14		19.22	19.13	19.45					

		73	74	76	77	78	80	81	82	83	85	87	88
July	12	19.29	19.44	19.42	18.91	19.36	19.17	19.07	18.98	19.63	19.24	19.35	19.01
	13	19.17	19.21	19.17	19.06	19.35	19.21	19.13	19.14	19.45	19.32	19.43	19.23
	16	19.47	19.28	19.27	19.01	19.20	19.40	19.25	19.10	19.38	19.11	19.43	19.05
	21	19.34	19.20	19.56	19.21	19.69	19.61	19.44	19.12	19.30	19.07	19.48	19.44
	25	19.17	19.17	19.21	18.88	19.37	19.41	19.52	19.18	19.24	19.26	19.16	19.30
	26	19.11	18.91	19.20	19.12	19.12	19.24	19.37	19.13	19.32	19.09	19.25	19.07
Aug.	4	19.50	18.93	19.38	19.15	19.03	19.31	19.22	19.16	19.11	19.13	19.28	19.27
	5	19.32	19.32	19.25	18.89	19.44	19.19	19.26	19.18	19.25	19.09		
	11	19.21	19.28	19.15	18.98	19.27	19.44	19.09	18.91	18.94	18.72	19.03	18.98

		81	82	83	85	87	88	89	91	92	94	95	96
Aug.	14	19.23	19.06	19.37	19.30	19.35	19.16	19.34	19.03	18.92	19.24	19.15	19.26
	16	19.51	19.37	19.58	19.02	19.23	19.18	19.03	18.99	19.02	18.83	18.87	18.80
	21	19.00		19.25	19.10	19.02	19.07	19.06	18.94	18.80	19.17	19.37	19.00
	22	19.05	19.61	19.27	19.07	19.29	19.28	19.26	18.98	19.08	19.06	18.71	19.10
	23	19.13	19.09	19.13	19.25	19.50	19.03	19.43	19.13	18.85	19.24	18.98	19.27
	26	19.49	19.21	19.18	19.04	19.49	19.33	19.24	18.97	19.12	18.98	19.02	19.07
	27	19.24	19.13	19.14	19.24	19.14	19.15	19.31	19.14	18.63	19.09	19.16	18.89
	29	18.97	19.13	19.40	19.30	19.26							
Sept	21	19.12	19.09	19.34	18.89	19.10	18.86	19.26	18.92	18.75	18.97	18.99	18.96

		89	91	92	94	95	96	2	3	4	5	7	8
Oct.	4	19.11	19.03										
	6	19.07	19.34	18.54	19.27	18.90	18.74	18.99	19.27	19.27	19.25	19.24	19.09
	7	19.32	18.88	19.12	19.27	18.78	19.10	19.10	18.91	19.45	19.11	19.06	18.86
	8	19.22	19.04	18.82	19.22	18.94	18.93	19.33	19.07	19.14	19.33	19.16	18.91
	14	19.06	18.96	18.80	19.21	18.96	19.03	19.14	19.01	19.49	19.27	19.24	19.15
	15	19.11	19.15	18.78	19.21	18.92	18.93	19.13	19.49	19.36	19.33	19.10	18.91
	18	19.04	[illegible]	18.96	19.03	18.90	18.97	19.28	18.99	19.52	19.28	19.06	19.07
	20	19.18	19.12	18.62	18.94	19.11	18.97	19.27	19.01	19.13	19.27	18.94	19.16
	21	19.15	18.97	18.81	19.18	18.97	18.90	19.20	19.20	19.15	19.17	19.38	18.89
	23	18.97	19.06	18.57	18.96	19.10	18.91	19.33	19.11	19.05	19.16	19.21	18.92
	26	19.07	19.06	19.00	19.16	18.86	19.11	19.38	19.02	19.66	19.33	19.17	19.01
Nov.	1		18.89	18.70	19.00	18.88	18.72	19.08	18.91	19.47	19.31	18.79	18.94

1902		2	3	4	5	7	8	9	11	12	13	14	15
Nov.	1				19.18		18.90	18.91		19.60	18.96	19.26	19.19
	2				19.26	19.27	18.88				19.53	19.36	
	3		19.28	19.30		18.96				19.61	19.00	19.19	19.51
	4					19.04	19.08	19.29		19.41			
	6						19.00	19.18				19.20	
		19.07	19.07	19.54		19.18	19.08		18.92				19.40
			18.97						19.09		19.05		
					19.09			19.10	18.72	19.21			19.40
Dec.				19.62			18.82		18.93	19.26			

		9	11	12	13	14	15	17	18	20	21	22	23
Dec.							19.39	19.15					
							19.25	18.96		19.20			19.29
	21												
	24												
	26			19.80		19.06							
	30			19.72		19.51							
	31						19.34	19.10			19.49	19.53	

1903		17	18	20	21	22	23	25	26	28	30	31	32
Jan.	8	19.19	19.04	19.60	19.30								
	13	19.13	19.05	19.37	19.12	19.43	19.49	19.58					
	14	19.28	19.02	19.07	19.32	19.30	19.33	19.38					
	17	18.89	18.81	19.28	19.11	19.04	19.03	18.98	19.24	19.67	19.90		

		25	26	28	30	31	32	33	35	36	37	39	40
Feb.	2		19.49			19.45		19.09					
	5	19.17	19.73			19.48	19.25	19.26	19.20	19.43	19.67	19.31	
	9		19.53	19.45			19.75			19.71		19.15	
	12				19.86	19.77							
						19.61							
	20	19.28		19.29	20.06		19.71	19.53	19.43			19.54	19.46
	22							18.92		19.45	19.83		
	24		19.35			19.60	19.18	19.10	19.48	18.79	19.53	19.49	

		33	35	36	37	39	40	41	42	43	44	46	47
Feb.	25	19.14	19.16			19.29	19.25						
Mar.	3		19.21					19.62			19.71		19.71
	12	18.90		19.40	19.66				19.21		20.06		
	17			19.54		19.60	19.50		19.19	19.14	19.67	19.26	19.30
	18	19.05	19.41	19.21		19.25	19.66			19.19			19.58
	19				19.64			19.84				19.13	
	21	19.61	19.16	19.88	19.85					19.37			19.74

1903		41	42	43	44	46	47	49	50	51	53	54	55
			′	″	″	″	″	″	″	″	″	″	″
Mar.	25	[illegible]	18.90	19.37	19.71	19.26	19.72	19.47	19.27	19.76	19.55	19.23	19.45
	26	[illegible]	19.72	19.47	19.56	19.13	19.52	19.12	19.52	19.62	19.61	19.83	19.43
	28	19.60	19.15	19.99	19.59	19.44	19.89	19.38	19.51	19.92	19.44	19.63	19.54
	31	19.35	19.50	19.18	19.68	19.15	19.72	19.27	19.63	19.42	19.47	19.54	19.42
Apr.	4	19.52	19.56	19.28	19.70	19.45	19.59	18.74	19.64	19.23	19.39	19.68	19.40
	8	19.57	19.00	19.62	19.69	19.15	19.33	19.68	19.54	19.81	19.28	19.29	19.28
	9	19.73	19.81	19.32	19.68	19.31	19.41	19.21	19.34	19.57	19.13	19.32	19.83

		49	50	51	53	54	55	57	58	61	62	63	64
Apr.	17	19.33	19.50	19.75	19.46	19.45	19.54	19.57	19.87	19.22	19.30	19.49	19.72
	20	19.00	19.47	19.50	19.30	19.34	19.44	19.46	19.73	18.93	19.45	19.63	19.25
	23	19.10	19.62										
	26	19.31	19.31	19.71	19.65	19.38	19.48	19.67	19.56	19.59	19.06	19.51	19.35
	27	19.00	19.40	19.71	19.33	19.70	19.55	19.34	19.69	19.45	19.61	19.33	19.49
	28	19.57	19.44	20.12	19.39	19.32	19.71	19.53	19.67	19.40	19.37	19.55	19.59
May	1	19.16	19.61	19.60	19.38	19.88	19.45	19.52	19.77	19.53	19.74	19.21	19.34
	2	19.47	19.79	19.82	19.44	19.18	19.30						
	3	19.28	19.56	19.53	19.41	19.79	19.55	19.20	19.50	19.04	19.19	19.07	19.26
	4	19.39	19.62	19.79	19.62	19.72	19.04	19.40	19.75	19.20	19.30	19.68	19.33
	7	19.30	19.73	19.73	19.47	19.57	19.51	19.60	19.94	19.33	19.86	19.45	19.33
	8	19.34	19.61	19.60	19.66	19.37	19.77	19.52	19.68	19.26	19.21	19.34	19.50

		57	58	61	62	63	64	66	67	68	70	71	72
May	14			19.42	20.04	19.30	19.36	19.17	19.33	19.61	19.63	19.34	19.51
	15	19.67	19.55	19.02	19.09	19.62	19.24	18.98	19.56	19.33	19.49	19.61	19.05
	16	19.56	19.72	19.38	19.82	19.46	19.17	19.30	19.54	19.49	19.54	19.48	19.77
	18	19.34	19.63	19.19	19.14								
	22	19.61	19.32	19.32	19.51	19.29	18.96	19.13	19.45	19.34	19.83	19.39	19.39
June	2	19.37	19.77										
	6	19.66	19.87	19.25	19.73		19.12						
	8	19.51	19.56	19.21	19.37	19.10	19.00	18.95	19.36	19.07	19.34	19.22	19.46

		66	67	68	70	71	72	73	74	76	77	78	80
June	11	18.97	19.11	19.41									
	12	19.16	19.18	19.53	19.51	19.97	19.33	19.66	19.61	19.61	19.21	19.36	19.68
	14	18.95	19.18	19.32	19.56	19.45	19.50	19.73					
	15	19.21	19.47	19.39	19.81	19.66	19.67	19.82	19.43	19.57	19.12	19.56	19.63
	17	19.28	19.51	19.63	19.71	19.44	19.48	19.56	19.69	19.73	19.67	19.58	19.69
	18	19.24	19.71		19.28	19.39	19.55	19.89	19.38	19.25	19.12	19.46	19.62
	21	18.82	19.71	19.61	19.72	19.38	19.32	19.42	19.35	19.69	19.37	19.63	19.74
	28	19.08	19.31	19.25	19.33	19.34	19.35	19.35	19.44	19.55	19.16	19.49	19.52
	30	19.11	19.40	19.65	19.50	19.38	19.30	19.62	19.43	19.40	19.61	19.65	19.52
July	1	19.24	19.40	19.42	19.51	19.24	19.15	19.33	19.72	19.61	19.12	19.53	
	2	19.33	19.31	19.27									
	3	19.26	19.57	19.69	19.55	19.26	19.18	19.28	19.39	19.42	19.47	19.28	19.65
	5	19.3		19.35	19.62	19.10	19.48	19.23	19.56	19.44	19.42	19.36	19.76

1903		73	[illegible]	[illegible]	77	[illegible]	80	81	82	[illegible]	[illegible]	[illegible]	88
[illegible]	[illegible]	[illegible]	19.01	[illegible]	19.16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19.20	19.58	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19.78	19.96	19.73	19.51	19.64	[illegible]	[illegible]	19.43
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19.91	19.43	19.31	19.61	19.17	19.40	[illegible]
	[illegible]	[illegible]	19.41	[illegible]	19.15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19.49
	[illegible]	19.18	19.15	[illegible]	19.17	[illegible]	[illegible]	19.26	19.57	19.50	19.34	[illegible]	19.68
[illegible]	[illegible]	[illegible]	19.29										
	[illegible]	[illegible]	19.73	[illegible]	19.37	[illegible]	[illegible]	19.41					
	[illegible]	[illegible]	19.15	19.24	[illegible]	[illegible]	[illegible]	19.45	[illegible]	19.39	19.15	[illegible]	[illegible]
	[illegible]	[illegible]	19.39	[illegible]	[illegible]	[illegible]	19.61	[illegible]	[illegible]	19.37	[illegible]	[illegible]	19.27
	[illegible]	19.29	[illegible]	[illegible]	[illegible]	19.64	[illegible]	19.47	19.21	[illegible]	[illegible]		
	[illegible]	[illegible]	19.37	19.62	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19.24	[illegible]	

		81	82	83	84	87	88	89	91	92	94	95	96
[illegible]	[illegible]	[illegible]	[illegible]	19.29	19.08	19.26	[illegible]	19.42	[illegible]	[illegible]	19.25	19.12	[illegible]
	16	[illegible]	19.43	19.47	[illegible]	19.46	[illegible]	[illegible]	19.20	19.29	[illegible]	19.29	19.29
	[illegible]	[illegible]	19.35	19.47	19.39	19.46	[illegible]	[illegible]	[illegible]	19.13	19.33	[illegible]	19.29
	[illegible]	19.39	19.52	[illegible]	19.44	[illegible]	19.49	19.54					
	[illegible]	[illegible]	[illegible]	19.38	19.35	19.23	19.20	19.27	18.99	18.98	19.05	18.99	19.81
	[illegible]	[illegible]	19.07	19.47	19.47	19.48	19.20	19.55	[illegible]	18.99	19.14	19.24	19.20
[illegible]	18	19.27	19.15	19.43	19.12	[illegible]	19.00	18.97	19.16	19.18	19.33	19.19	18.98
	[illegible]	[illegible]	[illegible]	19.37	[illegible]	19.27	19.41	19.12	[illegible]	18.99	19.55	19.01	[illegible]
	23	19.17	19.40	19.58	19.12	[illegible]	19.07	[illegible]	19.20	18.98	19.18	19.48	19.02
	25	19.54	[illegible]	19.23	[illegible]	19.37	19.33	19.27	19.34	[illegible]	19.26	[illegible]	18.99

		89	91	92	94	95	96	2	3	4	5	7	8
[illegible]	[illegible]	19.46	19.31	19.10	[illegible]	19.53	19.00	19.64	19.37	[illegible]	[illegible]	19.20	19.35
	[illegible]	[illegible]	[illegible]	19.27	19.06	19.08	19.08	19.44	19.26	[illegible]	19.46	19.42	[illegible]
[illegible]	[illegible]	19.20	[illegible]	18.84	18.97	19.18	19.01	19.01	18.89	19.45	19.26	19.15	19.00
	[illegible]	19.45	19.04	18.70	[illegible]	18.74	18.96	[illegible]	19.49	19.49	[illegible]	19.00	18.98
	[illegible]	[illegible]	[illegible]	18.95	19.23	19.31	[illegible]	19.18	19.37	[illegible]	[illegible]	19.39	19.21
	13	[illegible]	[illegible]	19.00	[illegible]	[illegible]	19.07	19.37	19.48	19.80	19.59	19.31	[illegible]
	[illegible]	[illegible]	19.11	19.09									
	[illegible]	19.01	[illegible]	18.79	18.84	18.96	[illegible]	[illegible]	[illegible]	[illegible]	19.40		
	[illegible]	[illegible]	19.02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19.42	[illegible]	19.05	[illegible]
	20	[illegible]	18.81	18.97	[illegible]	18.81	19.10	19.04	19.39	19.51	19.42	19.08	[illegible]
	21	19.00	[illegible]	19.03	18.83	19.13	18.98	19.37	[illegible]	[illegible]	19.33	19.21	[illegible]
	26	[illegible]	19.09	18.88	[illegible]	18.88	[illegible]	[illegible]	[illegible]	[illegible]	19.29	19.02	18.78
	27	19.02	[illegible]	18.94	19.27	19.02	[illegible]	19.04	[illegible]	19.57	19.46	[illegible]	[illegible]

		2	3	4	5	7	8	9	11	12	13	14	15
[illegible]	[illegible]	[illegible]	[illegible]	19.02	[illegible]			19.25	19.02	[illegible]	[illegible]	[illegible]	[illegible]
	6	19.21	[illegible]	[illegible]	[illegible]	19.14	[illegible]	[illegible]	19.18	19.48	[illegible]	18.83	19.39
	8	19.35	19.26	[illegible]	[illegible]	19.21	18.95	[illegible]	19.22	[illegible]	19.26	19.46	19.42
	[illegible]	19.31	18.92										
	[illegible]	19.40	19.06	19.55	[illegible]	19.08							
	14					18.66	18.87	19.32	[illegible]	[illegible]	19.06	[illegible]	18.94
	15					19.48	18.91	[illegible]	[illegible]	19.55			
	18	19.31	[illegible]	19.23	[illegible]	19.02	19.28						
	19							[illegible]	[illegible]	[illegible]	[illegible]	19.57	19.54
	22	19.18	[illegible]	[illegible]	19.27	18.97	18.67	19.41		19.35	[illegible]	19.26	[illegible]
	26	18.93	19.00	19.46	19.27	[illegible]	18.94						
[illegible]	3	[illegible]	[illegible]	19.26	[illegible]	[illegible]	[illegible]	19.27	19.45	[illegible]	19.21	[illegible]	19.48

1903		9	11	12	13	14	15	17	18	20	21	22	23
		"	"	"	"	"	"	"	"	"	"	"	"
Dec.	7	19.48	19.18	18.94	19.36	19.30	19.40	19.44	19.02	18.98	19.13	19.03	19.43
	11		19.32	19.72	19.47	19.30	19.31	19.00	18.92	19.23	19.34	19.29	19.23
	15	19.30	18.84										
	16							19.42	18.87	19.26	19.32	19.37	19.39
	17	19.02	19.00	19.41	19.36	19.53	19.41						
	18	19.30	19.26	19.33	19.29	19.23	19.61	19.30	19.03	19.20	19.28	18.97	19.47
	22	19.14	19.11	19.71	19.04	19.27	19.38	18.86	19.09	19.26	18.95	19.47	18.90
	31	19.39	18.91	19.26	19.53	19.26	19.36	19.11	18.94				
Jan.	4		19.30	19.08	19.57	19.23	19.49	19.32	19.10	19.25	19.41	19.36	19.42

1904		17	18	20	21	22	23	25	26	28	30	31	32
Jan.	5	19.42	18.95	19.23	19.17	19.33	19.23	19.48	19.51	19.60	19.66	19.57	19.31
	9	19.37	18.83	19.22	19.13	19.20	19.26	19.30					
	15	18.90	19.13										
	16	18.98	19.03	19.07	19.00	19.04	19.11	19.32	19.57	19.17	19.90	19.14	19.38
	18	19.33	19.00	19.22	19.42								
	27	19.11	19.00	19.06	19.23	19.20	19.42	19.26	19.26	19.48	19.85	19.69	19.31
	30	19.23	18.97	19.18	19.17	19.10	19.02	19.55					

		25	26	28	30	31	32	33	35	36	37	39	40
Feb.	1	19.45	19.25										
	4	19.30	19.29	19.58	19.89	19.36	19.31	18.80					
	6	19.51	19.73	19.35	19.60		19.30						
	10	19.61	19.52	19.27	19.68	19.70	19.20	19.06	19.31	19.02	19.48	19.36	19.18
	12	19.18	19.33	19.52	19.97	19.44	19.51	19.25	19.23	19.45	19.65	19.23	19.42
	16	19.24	19.56	19.32	19.73	19.46	19.32	19.22	19.48	19.18	19.55	19.61	19.15
	19							19.63	19.18	19.39	19.28	19.47	19.62
	22	19.34	19.23										
	24	19.45	19.50	19.40	19.68	19.61	19.35	19.33	19.42	19.07	19.50	19.35	

		33	35	36	37	39	40	41	42	43	44	46	47
Mar.	3	19.31	19.37	19.08	19.25	19.00	19.21	19.73	19.65	19.04	19.32	19.03	19.31
	4	19.19	19.08	19.28	19.57								
	8					19.26	19.32	19.44	19.36	19.01	19.33	19.00	19.48

		41	42	43	44	46	47	49	50	51	53	54	55
Mar.	23	19.81	19.08	19.04	19.71	19.23	19.16	19.25	19.19	19.31	19.56	19.00	19.40
Apr.	1	19.61	19.16	19.13	19.54	19.20	19.42	19.16	19.08	19.57	19.19	19.37	19.16
	2	19.73	19.12	19.24	19.57	19.26	19.66	19.06	19.06	19.22			
	3	19.81	19.31	19.39	19.79	19.34	19.75	19.22	19.47	19.32	19.73	19.34	19.41
	8	19.51		19.24	19.61								
	14	19.46	19.57	19.24	19.64	19.20	19.38	19.43	19.53	19.07	19.60	19.13	19.50

		49	50	51	53	54	55	57	58	61	62	63	64
Apr.	16	19.06	19.41	19.46	19.48	19.08	19.16	19.48	19.61	19.26	19.73	19.35	19.36
	19		19.09	19.51	19.64	18.98	19.23	19.25	19.63	19.00			
	20	19.25	19.36	19.42	19.50	19.38	19.71	19.26	19.63	19.49	19.49	19.37	19.35
	29	19.23	19.18	19.67	19.58	19.30	19.41	19.38	19.45	19.28	19.23	19.46	19.32
May	4	19.22	19.01	19.64	19.36	19.36	19.46	19.43	19.66	19.52	19.23	19.68	19.53
	5	18.92	19.07	19.59	19.27	19.36	19.20	19.35	19.48	19.32	19.68	19.66	19.19
	10	19.11	19.38	19.42	19.27	19.18	19.16	19.40	19.55	19.40	19.21	19.28	19.12
	11	19.15	19.26	19.42	19.40	19.30	19.31	19.59	19.58	19.11	19.53	19.28	19.24

1904		57	58	64	65	66	67	68	70	71	72	
May	18	19.24			19.16	19.30	19.04	19.57	19.39	19.45	19.47	
	20	19.10	19.40			19.38	19.17	19.28	19.29	19.53	19.76	
	24	19.42					19.16	19.10		19.52	19.13	19.41
	28	19.27			19.42	19.73			19.54	19.38	19.43	19.43	19.37
June	1					19.64	19.28				19.27	
	4	19.21										
	13				19.34	19.22		18.88		19.33		19.37

		66	67	68	70	71	72	73	74	76	77	78	80
June	10	18.96		19.40	19.53		19.39			19.59		19.45	19.59
	11	18.94		19.53	19.46		19.19	19.54	19.22	19.76	19.16	19.72	19.55
	16			19.31	19.45	19.31	19.46	19.47	19.47		19.30		19.87
	17	19.13		19.60	19.61	19.37	19.59		19.31		19.60		
	18		19.51			19.23			19.47		19.19		19.42
	20			19.55		19.11	19.43						
July	1		19.67		19.43	19.33		19.39		19.55	19.31		19.69
	2				19.54	19.27		19.54	19.15	19.44		19.87	
	7	19.08	19.66		19.31	19.37				19.78	19.82	19.80	19.44

		73	74	76	77	78	80	81	82	83	85	87	88	
July	12				19.40	19.69		19.48	19.58			19.66		
	13	19.22	19.20	19.37	19.20	19.70	19.41	19.34	19.09	19.39	19.43		19.41	
	16		19.22	19.43	19.08		19.71	19.71	19.48	19.46		19.40	19.35	
	17				19.24	19.72	19.86	19.22		19.15	19.47		19.36	
	23		19.14	19.53		19.64			19.37	19.64				
	26		19.50		19.54	19.46								
	29						19.41			19.53		19.64		
Aug.	2	19.62	19.27											
	3	19.60	19.20	19.62										
	5	19.16		19.62		19.51				19.27	19.15			
	8		19.44	19.51	19.34		19.78	19.69	19.45			19.76	19.39	
	9	19.44	19.22	19.54	19.40				19.35	19.51	19.14	19.80	19.38	S

		81	82	83	85	87	88	89	91	92	94	95	96	
Aug.	28				19.42		19.09		19.04			19.13		S
	30	19.26	19.53	19.55		19.61	19.27	19.68		19.34		19.44	19.31	S
	23		19.40	19.47	19.19	19.64		19.26	19.29	19.32				S
	26	19.22		19.49		19.64	19.24		19.05			18.86	19.31	S
	27	19.28		19.78	19.47				19.16			19.06		S
Sept.	1	19.42		19.47				19.31	19.50				19.42	S
	3			19.46		19.40	19.21	19.20	18.93	19.08	19.32		19.13	S
	5		19.31			19.72	18.93		19.39	19.39	19.54			S
	6	19.42	19.37		19.18	19.70	19.34	19.48	19.08	19.16			19.32	S
	7	19.26	19.48		19.47	19.61		19.48	19.28	19.53	18.90	19.15	19.52	S
	13	19.18		19.31	19.60		19.46	19.40						S
	15		19.43	19.40	19.46	19.60	19.10			19.21		19.18		S
	21	19.26		19.42		19.55	19.26			19.17			19.29	S
	22		19.33			19.95		19.62		19.34	18.93	19.09		S

OBSERVED LATITUDES

1904		89	91	92	94	95	96	2	3	4	5	7	8	
		″	″	″	″	″	″	″	″	″	″	″	″	
Sept.	29	19.14	19.46	19.06	19.45	19.61	19.10							
Oct.	1	19.60	19.06	19.31	19.33	19.23	19.40	19.53	19.48	19.46	19.62	19.44	19.19	
	3	19.17	19.30	18.82	19.27	19.44	19.15	19.32	19.59	19.68	19.58	19.21	19.50	
	6	19.52	19.58	19.26	19.24	19.23	19.39	19.45	19.42	19.93	19.79	18.92	19.42	
	12	19.21	19.05	18.95	19.42	19.14	19.35	19.68	19.43	19.59	19.49	19.41	19.13	
	14		19.65	19.11	19.47	19.07	19.20							
	15	19.38	19.12	18.98	19.17	19.20	18.84	19.51	19.45	19.60	19.54	19.37	18.96	
	17	19.32	19.28	18.91	19.23	19.16	19.26	19.57	19.46	19.79	19.61	19.34	19.04	
	18	19.46	18.96	19.12	19.27	19.11	19.24	19.38	19.56	19.64	19.45	19.53	18.82	
	24	19.63	19.36	19.07	19.39	19.07	19.37	19.40	19.19	19.85	19.23	19.08	19.27	
	26	19.55	19.35	18.86	19.31	19.45	19.25	19.42	19.46	19.60	19.44	19.75	19.31	
Nov.	1	19.55	19.06	19.13	19.28	19.02	19.41	19.88	19.50	19.57	19.77	19.34	19.13	

		2	3	4	5	7	8	9	11	12	13	14	15	
Nov.	4	19.48	19.61	19.42	19.66	18.95	19.34	19.47	19.25	19.53	19.62	19.52	19.75	
	11	19.46	19.14	19.40	19.30	19.20	19.48	19.28	19.39	19.58	19.17	19.58	19.43	
	13	19.13	19.27	19.66	19.44	19.29	19.10	19.44	19.02	19.38	19.60	19.41		
	14	19.33	19.49	19.42	19.44	19.21	19.34	19.50	19.38	19.56	19.56	19.69	19.19	
	18	19.40	19.48	19.69	19.32	19.31	19.31	19.40	19.41	19.47	19.58	19.72	19.55	
	19	19.34	19.15	19.71	19.54	19.48	19.14	19.46	19.47	19.61	19.49	19.31	19.46	
	21	19.52	19.45	19.62	19.48	19.36	19.17	19.45	19.12	19.77	19.66	19.50	19.90	
	28	19.53	19.14	19.57	19.46	19.34	19.14	19.31						
Dec	5	19.07	19.51	19.38	19.76	19.25	19.12	19.53	19.25	19.77	19.79	19.37	19.48	

		9	11	12	13	14	15	17	18	20	21	22	23	
Dec	7	19.41	19.41											
	10		18.80	19.12	19.25	19.13	19.84	19.02	19.33	19.00	19.08	19.63	19.36	
	14	19.51	19.48	19.33	19.84	19.44	19.49	19.13	19.08	19.69	19.60	19.29	19.62	
	20	19.40	19.14	19.77	19.75	19.17	19.77	19.07	19.37	19.04	19.20	19.49	19.58	
	21	19.54	19.33	19.62	19.52	19.57	19.71	19.46	19.14	19.23	19.49	19.38	19.58	
	29	19.11	18.92	19.58	19.26	19.07	19.37	19.20	19.16	19.26	19.27	19.30	19.42	
	30	19.41	18.70	19.34	19.39	19.16	19.40	19.20	18.83	19.15	19.15	19.14	19.35	
Jan	3	19.34	19.07		19.21	19.22	19.01	19.46	19.05	18.74	19.29		19.07	S

1905		17	18	20	21	22	23	25	26	28	30	31	32	
Jan	14					18.84	19.00	18.77						S
	16	19.53	19.02	19.06	19.35	19.00	18.84	19.04		19.40	19.84	19.35	19.20	S
	25			19.00	18.82	18.84	18.68	19.27	19.25		19.22	19.10	18.74	S
	26	19.13	18.77		19.26		19.25		19.67	19.14	19.37	18.80	19.45	S
	27	18.92	19.04	18.89	19.16	18.92	18.77	18.98	19.54					S
	28	19.12	18.56	18.98	18.82	18.89	19.07	19.36	19.16	19.37	19.58	19.49	19.15	S

		25	26	28	30	31	32	33	35	36	37	39	40	
Feb.	3	18.99	19.30	19.22	19.69	19.68	19.16	18.99	18.81	19.34	19.55	19.28	19.50	S
	4	19.05	19.44	19.33	19.75	19.29	19.28	18.79	19.14	19.31	19.31	19.46	18.98	S
	6	18.98	18.89	19.07	19.19	18.98	19.01	18.73	18.89	18.83	19.59	19.51	18.70	S
	10	19.14	19.48	18.73	19.62	18.94		18.50	19.00	18.97	19.33	18.93	19.32	S
	15	19.04			19.56	19.44	19.20	19.12	18.90	19.37	19.59	19.32	19.00	S
	17	19.20	19.49	19.15	19.62	18.86	19.05		18.79	19.06	19.53	19.07		S

1905		33	35	36	37	39	40	41	42	43	44	46	47	
Feb.	21			19.38	19.51		19.43		19.20					
	25						18.95	18.75		19.26		19.28		S
Mar.	1							19.20					19.41	S
	2			19.04		19.14								S
	10						18.95		18.88	19.07				S
	11		18.94		19.29		19.19				19.29	19.03		S
	14					19.14		19.09		19.38		18.32	19.14	S
	17			19.06	19.34	19.02			18.81	18.90			19.49	S

		41	42	43	44	46	47	49	50	51	53	54	55	
Mar.	26			19.20			19.09							
	27		18.96	18.75		18.99	19.11			19.44	19.17	18.96	19.27	
	28	19.62		19.18			19.37	19.15	19.13	19.55	19.15	18.81		S
	28		19.19		19.39	19.02	19.15	19.03		19.26	19.08	19.27	19.22	S
	29	18.97	18.97		19.48	18.73	19.33	18.87	19.16		19.02	18.98		S
Apr.	1	19.29	19.06	19.04			19.09	19.00	18.94	19.27	19.39	18.98	19.26	S
	1	19.31		19.17	19.46	18.70		18.81		19.07	18.82			S
	3					18.46	18.95	18.97	18.96		18.77	18.96	19.04	S
	5						19.16	18.95	18.85					S
	12					19.17	19.50	19.24		19.44	19.08	18.91	19.07	
	14	19.42	19.14		19.27	18.79	19.35	18.69		19.22	19.20	19.80	19.62	

		49	50	51	53	54	55	57	58	61	62	63	64	
Apr.	20								19.29			18.93		S
	22	19.07		19.27				19.07	19.08	18.88	18.98	18.97		S
	23				19.31	18.88		19.22	19.52	18.97	18.83	18.70		S
	29		19.04			18.65	19.27							S
May	1		18.93			19.02	19.18						18.96	S
	5			19.30					19.55	19.00	19.23	19.18		S
	6													
	10					19.30	19.14	19.27	19.28	19.07		19.06	18.77	

		57	58	61	62	63	64	66	67	68	70	71	72	
May	20		19.33	19.17				18.72		19.04	19.08	19.16	19.10	
	20	19.13												S
	22	19.07	19.19											S
	23		19.33	19.02		19.45			19.17	19.10	19.19			S
	24		19.47	18.91	18.97	18.72								S
	26		18.70		18.90	18.49								S
	31		19.29	18.77	18.98	18.74			18.97					S
June	1		19.24		19.06		18.95	18.95	19.43			19.19	19.06	S
	3		19.14	19.01										
	5	19.06		19.21	18.75	18.95	18.96	18.47	19.13	18.84				
	6	18.69	19.53	18.92		19.24								

1905		66	67	68	70	71	72	73	74	76	77	78	80	
		″	″	″	″	″	″	″	″	″	″	″	″	
June	12	19.11	19.43	19.18	19.18	19.01	19.09	19.36						
	13	18.89	19.29	18.98	19.14	18.89	19.32	19.26	19.06	19.52	18.73	19.33	19.11	S
	17	18.85	19.16	18.97	19.09	19.28								
	21	18.74	19.34	19.14	19.31	18.85	19.09	19.43	19.15	19.33	19.12	19.63	19.37	
	26	18.95	19.49	18.84	19.43	18.91	19.20	19.15	19.36	19.34		19.38	19.37	S
	27	18.70	19.38	19.17	19.41	19.12								S
	28	19.28	19.35	19.12	19.34	18.91	18.93	19.05	18.96	19.18	19.39	19.08	19.12	S
July	5	19.19	19.40	19.40	19.51	18.81			19.15	19.20	19.02			S
	8	18.83	19.45	18.81	19.44	19.16	19.32	19.18	18.94	19.44	18.94	19.27	19.31	

		73	74	76	77	78	80	81	82	83	85	87	88	
July	13	19.17	19.30	19.40		19.30	19.32	19.53	19.35	19.30	19.11	19.36	19.11	S
	14	18.87	19.21	19.25	19.00	19.08	19.35	19.38	19.16	19.31	19.23	19.68	19.07	S
	15	19.49	19.43	19.22	19.44	19.61	19.55	19.51	19.40	19.45	19.43	19.37	19.61	
	18	18.88	19.26	19.26	18.99	19.05	19.18	19.38						S
	22	19.14	19.30	19.22	19.08	19.12	19.26	19.41	18.99	19.12	19.10	19.58	19.34	S
	24	19.43	19.37	19.20	18.86	19.42	19.38		19.10	19.22	19.23	19.55	19.27	S
	25	19.47	19.31	19.42	19.21		19.74	19.20	19.04	19.36	19.27	19.36	19.41	S
	27	19.08	19.21	19.31	18.90	19.32								S
	31			19.63	18.99	19.14	19.23	19.50	18.99	19.25	19.03		19.36	S
Aug	1	19.63	19.53	19.50	19.38	19.34	19.79	19.54	19.28	19.44	19.39	19.51	19.70	
	4	19.47	19.29	19.51	19.16	19.38	19.49	19.42	19.18	19.49	19.50	19.69	19.44	
	8	19.19	19.63	19.55	19.22	19.22	19.53	19.09	19.32	19.56	18.99	19.56	19.71	S
	9	19.07	19.41	19.43	19.37	19.44	19.31	19.67	19.53	19.39	19.26	19.74	19.50	S

		81	82	83	85	87	88	89	91	92	94	95	96	
Aug.	16	19.41	19.24	19.42	19.57	19.36	19.43	19.52	19.39	19.36	19.27		19.28	S
	17	19.65	19.29	19.47	19.16	19.54	19.49	19.30	19.22	19.28	19.21	19.39	19.29	S
	21	19.25	19.19	19.33	19.36	19.34	19.35	19.46	18.82	19.29	19.42	18.87	19.12	S
	23	19.73	19.21	19.58	18.96	19.45	19.20	19.42	19.29	18.94	19.02	19.29	19.00	S
	25	19.41	19.12	19.30	19.25	19.47	19.61	19.46	19.25	19.01	19.34	19.25	19.12	S
	26	19.66	19.55	19.50	19.16	19.60	19.28	19.24	18.99	18.87	19.16	19.48	18.98	S
Sept	2	19.36	19.24	19.34	19.20	19.44	19.28	19.44						S
	8	19.23	19.22	19.52	19.41	19.45	19.42	19.41	18.95	19.12	19.43	19.17	19.01	S
	11		18.89	19.20										S
	12	19.34	19.24		19.09	19.72	19.16	19.37	19.10	19.32	19.44	19.19	18.94	S
	16					19.54	19.17	19.38	19.29	19.36	19.35	19.28	19.09	S
	18	19.45		19.47	18.96	19.53	19.62	19.40	19.21	19.15	19.33	19.32	19.01	S
	20	19.29	19.21	19.53	18.96	19.56	19.32	19.42	19.18	19.03	19.24	19.38	19.03	S
	21	19.31		19.48	19.24	19.55	19.17	19.26	18.95	18.80	19.00	19.34	18.96	S
	22	19.48	19.23	19.30	19.27	19.32	19.21	19.45	19.05	19.26	19.27	18.99	19.08	S

1905		80	01	[illegible]	04	[illegible]	06	[illegible]	[illegible]	[illegible]	5	7	8	
[illegible]														
Sept	20	[illegible]	19.38	[illegible]	19.59	[illegible]	[illegible]	19.49	19.55	19.74	[illegible]	19.29	19.19	
	21	19.01	[illegible]	[illegible]	[illegible]	19.21	[illegible]	[illegible]	19.19	19.61		19.28	[illegible]	S
	27	[illegible]	[illegible]	[illegible]	[illegible]	19.24	19.21	19.24	[illegible]	19.79	[illegible]	19.52	19.13	S
Oct	3	18.17	19.22	[illegible]	19.41	19.31	[illegible]	[illegible]	[illegible]	19.77	[illegible]	[illegible]	19.44	
	4	18.41	[illegible]	[illegible]	19.31	18.90	19.05	19.07	[illegible]	19.62	19.27	19.48	18.94	S
	5	19.28	19.48	19.33	19.10	19.13		[illegible]	19.42	19.91	[illegible]	19.48	[illegible]	S
	6	[illegible]	19.38	19.20	19.31	19.59	19.21	[illegible]	[illegible]	19.99	[illegible]	19.17	[illegible]	
	7	[illegible]	[illegible]	19.72	19.45	19.41	[illegible]	[illegible]	19.38	19.59	[illegible]	19.66	[illegible]	S
	10	[illegible]	[illegible]	19.26	19.21	[illegible]	19.08	19.28	19.27	19.66	19.41	19.48	[illegible]	S
	11	[illegible]	18.98	[illegible]	19.14	19.22	19.09	19.28	19.34	19.72	19.57	19.38	[illegible]	S
	12	18.86	[illegible]											S
Nov	1	[illegible]	[illegible]	[illegible]	19.07	19.19	[illegible]	19.18	19.09	19.37	19.43	[illegible]	19.39	

		2	3	4	5	7	8	9	11	12	13	14	15	
Nov	[illegible]			19.76	19.41	19.15	19.23	19.15	19.19	19.67	19.27	19.75	19.53	
	16	19.06		19.59	19.44	[illegible]	19.08	[illegible]	18.78	[illegible]	19.37	[illegible]	[illegible]	S
	17	19.43	[illegible]	19.90	19.31	19.24	[illegible]	19.60	19.29	[illegible]	[illegible]	19.51	19.70	
	18	[illegible]	[illegible]	19.59	[illegible]	19.41	19.19	19.70	19.04	[illegible]	19.71	19.76		S
	19	19.26	19.19	19.61	19.28	19.13	19.29	[illegible]	19.02	19.84		19.44	[illegible]	S
	20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19.11	[illegible]	[illegible]	[illegible]	19.56	19.47	[illegible]	S
	21	19.29	[illegible]	19.92	[illegible]	[illegible]	19.28	19.57	19.43	19.61	[illegible]	19.68		S
	23	[illegible]		19.71	19.19	[illegible]	18.99	19.63						S
	24	19.31	19.10	[illegible]	19.28	19.12	18.90	19.29	19.00	[illegible]	19.37	19.27		S
Dec	6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19.21	19.86	[illegible]	19.47	19.41	19.34	[illegible]	

		9	11	12	13	14	15	17	18	20	21	22	23	
Dec	[illegible]							19.23	19.37	[illegible]	[illegible]	[illegible]	19.51	S
	11	19.62	19.07	19.94	19.55	19.41	19.39	19.37	[illegible]	19.57	19.57	19.51	19.49	
	24	19.16	[illegible]	[illegible]	19.37	[illegible]	19.24	19.27	[illegible]					S
	25	19.42	18.85	19.42	[illegible]	19.67	[illegible]	[illegible]	18.87	[illegible]	19.51	[illegible]	19.18	S
	28	[illegible]	19.04	[illegible]	19.00	19.59	[illegible]	[illegible]	[illegible]	[illegible]	19.09	19.22	[illegible]	S
	27	19.43	19.10	19.40	19.40	[illegible]	19.51	18.78	19.04	[illegible]	18.95	19.22	19.44	S
	29	19.06	19.02	19.59	19.33	19.40	19.42	19.07	18.94	[illegible]	19.17	[illegible]	[illegible]	S

Taking the means of the groups, with the dates, we have:

		"		"
1899.69	XI	19.32	XII	19.19
.78	XII	19.15	I	19.43
.88	I	19.36	II	19.48
.97	II	19.43	III	19.30
1900.06	III	19.28	IV	19.51
.12	IV	19.46	V	19.31
.19	V	19.30	VI	19.33
.26	VI	19.25	VII	19.16
.33	VII	19.18	VIII	19.06
.40	VIII	19.06	IX	19.11
.49	IX	19.07	X	19.15
.56	X	19.14	XI	19.18
.66	XI	19.14	XII	19.01
.78	XII	19.08	I	19.35
.88	I	19.43	II	19.54
.97	II	19.50	III	19.32
1901.04	III	19.35	IV	19.54
.12	IV	19.52	V	19.37
.19	V	19.40	VI	19.40
.26	VI	19.35	VII	19.38
.33	VII	19.24	VIII	19.14
.40	VIII	19.07	IX	19.06
.48	IX	19.14	X	19.06
.57	X	18.99	XI	18.97
.68	XI	19.03	XII	18.98
.78	XII	18.95	I	19.19
.88	I	19.18	II	19.28
.99	II	19.31	III	19.23
1902.04	III	19.16	IV	19.37
.13	IV	19.48	V	19.39
.19	V	19.46	VI	19.54
.25	VI	19.47	VII	19.52
.33	VII	19.40	VIII	19.38
.39	VIII	19.43	IX	19.34
.48	IX	19.32	X	19.37
.56	X	19.24	XI	19.20
.65	XI	19.23	XII	19.05
.79	XII	19.00	I	19.17

		"		"
1902.87	I	19.18	II	19.23
.98	II	19.39	III	19.22
1903.05	III	19.24	IV	19.47
.12	IV	19.53	V	19.44
.20	V	19.46	VI	19.45
.25	VI	19.50	VII	19.46
.32	VII	19.50	VIII	19.46
.39	VIII	19.41	IX	19.39
.48	IX	19.41	X	19.51
.58	X	19.46	XI	19.42
.67	XI	19.35	XII	19.22
.79	XII	19.07	I	19.28
.87	I	19.15	II	19.34
.97	II	19.31	III	19.20
1904.05	III	19.15	IV	19.47
.12	IV	19.47	V	19.33
.18	V	19.24	VI	19.31
.26	VI	19.41	VII	19.31
.33	VII	19.31	VIII	19.41
.40	VIII	19.35	IX	19.36
.47	IX	19.36	X	19.49
.57	X	19.46	XI	19.42
.68	XI	19.41	XII	19.26
.79	XII	19.25	I	19.43
.88	I	19.36	II	19.48
.98	II	19.37	III	19.27
1905.07	III	18.99	IV	19.26
.12	IV	19.23	V	19.12
.19	V	19.09	VI	19.13
.25	VI	19.13	VII	19.11
.33	VII	19.12	VIII	19.05
.40	VIII	19.02	IX	19.08
.48	IX	19.14	X	19.22
.56	X	19.30	XI	19.36
.68	XI	19.34	XII	19.21
.77	XII	19.24	I	19.40
.88	I	19.34	II	19.47
.97	II	19.37	III	19.24

From a comparison of the groups observed simultaneously we obtain the following corrections to the group means

I	[illegible]	V	[illegible]	IX	[illegible]
II	[illegible]	VI	[illegible]	X	[illegible]
III	[illegible]	VII	[illegible]	XI	[illegible]
IV	[illegible]	VIII	[illegible]	XII	[illegible]

The corrections to the individual pairs are now found by comparison with the corrected group means

Pair 1	[illegible]	Pair 25	[illegible]	Pair 49	[illegible]	Pair 73	[illegible]
2	[illegible]	26	[illegible]	50	[illegible]	74	[illegible]
3	[illegible]	27	[illegible]	51	[illegible]	75	[illegible]
4	[illegible]	28	[illegible]	52	[illegible]	76	[illegible]
5	[illegible]	29	[illegible]	53	[illegible]	77	[illegible]
6	[illegible]	30	[illegible]	54	[illegible]	78	[illegible]
7	[illegible]	31	[illegible]	55	[illegible]	79	[illegible]
8	[illegible]	32	[illegible]	56	[illegible]	80	[illegible]
Pair 9	[illegible]	Pair 33	[illegible]	Pair 57	[illegible]	Pair 81	[illegible]
10	[illegible]	34	[illegible]	58	[illegible]	82	[illegible]
11	[illegible]	35	[illegible]	59	[illegible]	83	[illegible]
12	[illegible]	36	[illegible]	60	[illegible]	84	[illegible]
13	[illegible]	37	[illegible]	61	[illegible]	85	[illegible]
14	[illegible]	38	[illegible]	62	[illegible]	86	[illegible]
15	[illegible]	39	[illegible]	63	[illegible]	87	[illegible]
16	[illegible]	40	[illegible]	64	[illegible]	88	[illegible]
Pair 17	[illegible]	Pair 41	[illegible]	Pair 65	[illegible]	Pair 89	[illegible]
18	[illegible]	42	[illegible]	66	[illegible]	90	[illegible]
19	[illegible]	43	[illegible]	67	[illegible]	91	[illegible]
20	[illegible]	44	[illegible]	68	[illegible]	92	[illegible]
21	[illegible]	45	[illegible]	69	[illegible]	93	[illegible]
22	[illegible]	46	[illegible]	70	[illegible]	94	[illegible]
23	[illegible]	47	[illegible]	71	[illegible]	95	[illegible]
24	[illegible]	48	[illegible]	72	[illegible]	96	[illegible]

Finally, correcting the group means and combining the results of the two groups observed on the same evenings, we get the following definitive values for the latitude.

Groups	Date	Latitude
		″
XI — XII	1899.69	19.28
XII — I	.78	19.32
I — II	.88	19.38
II — III	.97	19.39
III — IV	1900.06	19.40
IV — V	.12	19.36
V — VI	.19	19.33
VI — VII	.26	19.20
VII — VIII	.33	19.13
VIII — IX	.40	19.10
IX — X	.49	19.10
X — XI	.56	19.13
XI — XII	.66	19.10
XII — I	.78	19.24
I — II	.88	19.44
II — III	.97	19.43
III — IV	1901.04	19.44
IV — V	.12	19.42
V — VI	.19	19.41
VI — VII	.26	19.32
VII — VIII	.33	19.20
VIII — IX	.40	19.10
IX — X	.48	19.04
X — XI	.57	18.96
XI — XII	.68	19.03
XII — I	.78	19.09
I — II	.88	19.19
II — III	.99	19.29
III — IV	1902.04	19.27
IV — V	13	19.41
V — VI	19	19.51
VI — VII	.25	19.50
VII — VIII	.33	19.40
VIII — IX	.40	19.34
IX — X	.48	19.34
X — XI	.56	19.20
XI — XII	65	19.15
XII — I	.79	19.11

Groups	Date	Latitude
		″
I — II	1902.87	19.17
II — III	.98	19.32
III — IV	1903.05	19.36
IV — V	.12	19.46
V — VI	.20	19.47
VI — VII	.25	19.47
VII — VIII	.32	19.49
VIII — IX	.39	19.42
IX — X	.48	19.45
X — XI	.58	19.41
XI — XII	.67	19.31
XII — I	.79	19.21
I — II	.87	19.20
II — III	.97	19.27
III — IV	1904.05	19.31
IV — V	.12	19.37
V — VI	.18	19.29
VI — VII	.26	19.35
VII — VIII	.33	19.37
VIII — IX	.40	19.37
IX — X	.47	19.42
X — XI	.57	19.42
XI — XII	.68	19.36
XII — I	.79	19.37
I — II	.88	19.38
II — III	.98	19.34
III — IV	1905.07	19.13
IV — V	.12	19.14
V — VI	.19	19.12
VI — VII	.25	19.11
VII — VIII	.33	19.09
VIII — IX	.40	19.06
IX — X	.48	19.18
X — XI	56	19.30
XI — XII	.68	19.30
XII — I	.77	19.35
I — II	.88	19.36
II — III	.97	19.33

The mean latitudes for the different years show considerable fluctuation, as is evident from the following table:

Year	Mean Latitude
[illegible]	[illegible] 19.28
[illegible]	[illegible] 19.21
[illegible]	[illegible] 19.31
[illegible]	[illegible] 19.38
1894	[illegible] 19.36
1895	19.21

This does not signify, of course, that the mean value of the latitude actually changes, but merely that the annual digressions are not symmetrical with reference to this mean position.

Taking the average value for the different groups, we get a slightly more accordant series, but it is evident that to entirely eliminate the effect of the variation a still longer term of observation is necessary.

Group	Latitude	Group	Latitude
I	[illegible] 19.28	VII	[illegible] 19.30
II	19.33	VIII	19.25
III	19.33	IX	19.24
IV	19.31	X	19.26
V	19.37	XI	19.28
VI	19.34	XII	19.20

The general mean of this series is

[illegible] 19.29 [illegible] 0".011

Adding to this the reduction to the center of the dome, 0".47, we get for the latitude of the Cincinnati Observatory

[illegible] 19".76 [illegible] 0".011